ANTIGUA AND BARBUDA FISHERIES DEVELOPMENT PLAN 2006 – 2010

FIRST DRAFT

THE PROJECT FOR CONSTRUCTION OF FISHERIES DEVELOPMENT CENTER IN ANTIGUA AND BARBUDA

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FORWARD

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Government of Antigua and Barbuda

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THE FISHERIES SECTOR

Background

The islands of Antigua and Barbuda are located in the Lesser Antilles island chain between 17° 00' N and 17° 44' N and 62° W and 61° 55' W, with the Atlantic Ocean to the east and the Caribbean Sea to the West, while a third (uninhabited) island, Redonda, lies to the southwest of Antigua at 16° 56' N and 62° 21' W. Barbuda, which lies 45 kilometres north of Antigua, is a flat coral island rising only 45 metres above sea level. The islands combine have a total land area of 442 kilometres^{2} (Antigua: 280 km^{2}; Barbuda: 160 km^{2}; and Redonda: 2 km^{2}).

Antigua, Barbuda and Redonda established itself as an archipelagic state in 1982 with a 12 nautical mile territorial sea, an Exclusive Economic Zone (EEZ) and a Fishery Zone of 200 nautical miles. The full extent of the EEZ is unknown since negotiations with neighbouring states of Montserrat, Guadeloupe, St. Kitts/Nevis, St. Barthelemey and St. Eustatius have not been completed. This relatively vast sea space is seen by many to offer vast potential for fisheries development especially for the migratory species.

It is estimated that Antigua and Barbuda has a total shelf area of 3,568 kilometres^{2}. This includes the Antigua and Barbuda shelf (3,400 km^{2}), South Bank (40 km^{2}), a section of Anguilla shelf (7 km^{2}), Redonda shelf (98 km^{2}), Havers Shoal (5 km^{2}) and a section of St. Christopher and Nevis shelf (18 km^{2}). The Antigua and Barbuda shelf that both islands emerge from is one of the largest in the Eastern Caribbean. Depth between the islands ranges from 27 to 30 metres, providing the ideal terrain for demersal resources such as reef fish, Caribbean spiny lobster and Queen conch.

Fisheries in the National Economy

The fisheries sector in Antigua and Barbuda has been perceived in the past as having relatively little importance, and hence there was very little input into the sector. Today there is increasing recognition of its potential to the general economy and its significance towards addressing issues such as balance of trade, unemployment, food security and nutrition.

Over the past decade, the fisheries sector on average has contributed to 50% of the agricultural GDP or 2% of the national GDP, in current prices (Table 1). The main contributors to the national GDP were the tourism-related service sectors, the construction industry, financial and government services.

Table 1. Contribution of the Fisheries Sector to Antigua and Barbuda's Gross Domestic Product, at Factor Cost, in Current Prices (EC$ Million).

	1995	1996	1997	1998	1999	2000	2001	2002	2003[Prel]
Total GDP at factor cost	1119.98	1219.97	1315.86	1414.07	1498.20	1555.93	1620.23	1653.32	1747.18
Crops	12.36	13.56	15.38	15.69	16.48	16.97	16.63	17.06	17.66
Livestock	10.36	10.79	11.06	11.50	12.02	12.32	13.00	13.45	13.99
Forestry	0.86	0.86	0.89	0.88	0.90	0.90	0.90	0.90	0.90
Fisheries	19.87	21.80	26.71	28.01	29.71	30.90	31.03	31.19	32.61
Agricultural GDP	43.45	47.01	54.04	56.08	59.11	61.09	61.56	62.60	65.16
Fisheries contribution to Agricultural GDP (%)	45.7	46.4	49.4	49.9	50.3	50.6	50.4	49.8	50.0
Fisheries contribution to Total GDP (%)	1.8	1.8	2.0	2.0	2.0	2.0	1.9	1.9	1.9

Source: Eastern Caribbean Central Bank National Accounts Statistics, 2004

Employment

Voluntary registration of fishers started in 1995 under CARICOM Fisheries Resource Assessment and Management Program (CFRAMP), a joint project between the Canadian International Development Agency (CIDA) and member countries of the Caribbean Community. While there have been growth with respect to registration, the numerous hurricanes experienced in the 1990s have impacted on employment levels. This is due to the fact that most fishing vessels were not insured. For example of the 1,088 fishers registered at the end of 2004, only 699 were actively fishing (Figure 1), which is 2% of the labour force of 33,000. An addition 50

individuals are employed in an underdeveloped processing sector. The high-energy cost associated with various forms of processing and inadequate access to capital has curtailed the development of this area. In terms of employment levels, values should be taken as conservative estimates since the fisheries sector continues to act as a “safety-net” for other economic activities. In other words, when there is a downturn in tourism and construction, individuals re-enter or increase their activity in the fisheries sector.

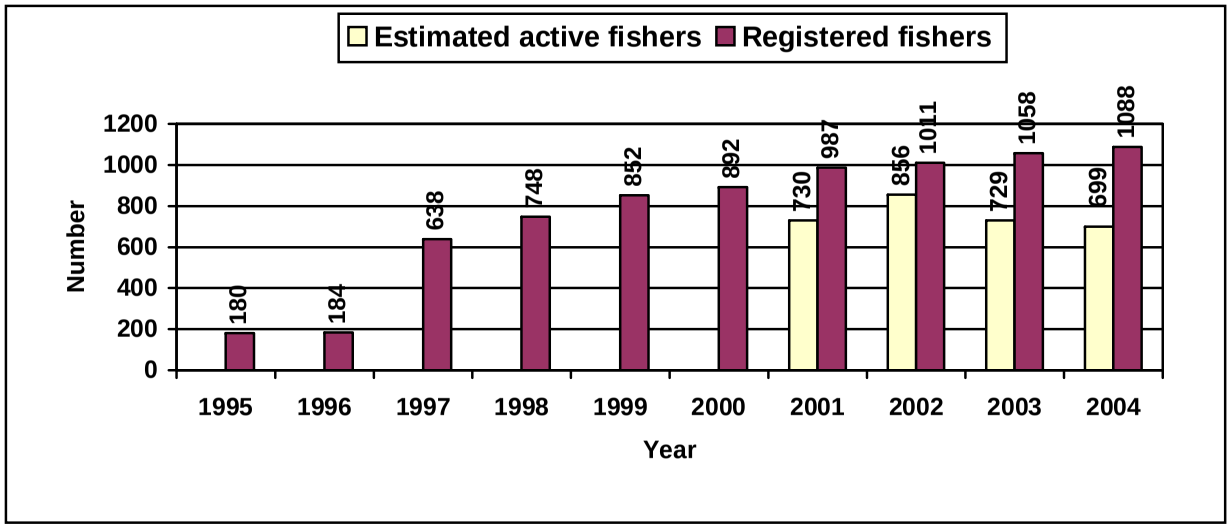


Figure 1. Number of registered and estimated active fishers at year-end in Antigua and Barbuda.

Natural Resources

From since the 1980s, Antigua and Barbuda has seen drastic alteration to the terrestrial as well as the coastal and marine environment. Much of this alteration is due to the change from a rural agricultural-based economy to one that is dominated by tourism (particularly for Antigua).

As in many small island states that depend on tourism, much of the development has taken place in coastal areas. Industrial activities are also primarily based in these areas. Coupled with these factors, is the issue of increasing urbanisation of the population. According to the Antigua and Barbuda Preliminary Census Report 2001, 59% of the estimated resident population of 75,700 reside within the city and parish of St. John's. The urban population is estimated at 32%. With total annual stay-over air arrivals and total annual cruise-ship passenger arrivals approximately 2 times and 5 times the estimated resident population (75,700 for 2001), and much of this activity taking place in the city and coastal areas where infrastructure is limited to handle waste and sewage, the present thrust for "mass tourism" has impacted significantly on the marine environment. These factors in combination with inadequate development planning and control as well as a lack of a comprehensive coastal management programme, has resulted in the degradation and or destruction of critical coastal and marine habitats vital to the sustainability of the marine resources.

Wetlands

Over the past decades, a number of critical wetlands have been negatively impacted upon by development. The following is a summary of selected wetland habitats that have been degraded or destroyed.

Table 2. Selected Wetland Habitats Impacted by Development in Antigua and Barbuda (Horsford 2001 a).

Site	Mangal Type and Area	Description and Status
McKinnon's Pond	Basin Mangrove 1 hectare in 1998 (EMPAL-Jacques Whitford Limited 1998)	Once a major fisheries nursery area and habitat for wetland birds. System progressively degraded over the past 30+ years due to coastal tourism development (hotel), industrial pollution (oil), and sewage disposal. Mangroves covered 20 hectares of the pond in 1968 (EMPAL-Jacques Whitford Limited 1998), 7.5 hectares in 1991 (Beacon 1991) and 1 hectare in 1998 (EMPAL-Jacques Whitford Limited 1998). In 1968, an embankment for connection of two roads restricted water exchange between the pond and the sea. Massive fish-kills occurred in the 1980s and 90s.
Fort James/The Cove	Fringe Mangrove 7.5 hectares in 1991 (Beacon 1991)	The majority of mangroves lost and the ecosystem degraded due to the deposition of dredge spoils from St. John's Harbour in the 1980s. Also pollution from waste disposal (industrial and domestic). Dredging contributed to beach erosion at Fort James.
Jolly Hill Salt Pond	Basin Mangrove	Major fisheries and wildlife habitat lost to condominium and marina

		development in the late 1980s. 21.4 hectares of mangrove swamp sold for $EC100 (De Albuquerque 1991).
Yorks Salt Pond	Lagoon with mangrove boarder 1.5 hectare in 1991 (Beacon 1991)	Important nursery area for marine species. Originally used as a safe refuge for fishing vessels during storms; deposition of dredge spoils from Jolly Harbour has restricted access. Sand mining and dredging have impacted on the habitat.
Deep Bay - Salt Pond	Basin Mangrove	Mangrove swamp lost to the development of the Royal Antiguan Hotel in the 1980s. Major salt producer lost.
Dark Wood Pond	Basin Mangrove 3.5 hectares in 1991 (Beacon 1991)	Salt-water marsh altered significantly over the past 30 years due to extensive sand mining. Mangroves lost in the process. In recent years hurricanes impacted on the remaining vegetation. System still functions as a fisheries habitat for tilapia, snook, tarpon, etc.
Fish Pond - Carlisle Bay	Basin Mangrove 20 hectares in 1991 (Beacon 1991)	Originally a dense mangrove system with a channel seaward (Fish Pond). One tenth of the area reclaimed for hotel development. Degradation caused by development, waste disposal, sedimentation and hurricanes. Part of the Cades Bay Marine Reserve in May 1999.
Coconut Hall	Fringe Mangrove	32 hectares of pristine hillside and mangroves cleared for tourism development (De Albuquerque and McElroy 1997).
Codrington Lagoon (Barbuda)	Lagoon with mangrove boarder 352 hectares in 1991 (Beacon 1991)	A relatively healthy wetland system, which houses a thriving frigate bird colony. System has been altered in recent years as a result of pollution, development, and hurricanes. System now showing signs of stress (e.g., the proliferation of green algae in certain areas; this is associated with eutrophication).

Beaches

The *beach* is one of the major coastal features that significantly contribute to the physical, social and economic development of Antigua and Barbuda. Beaches are significant because they form a direct link and buffer between land and sea. Sandy beaches depend on the coral reefs and algal beds for a constant supply of base material. In addition to its value to tourism and other biodiversity services around Antigua and Barbuda beaches provide nesting sites for marine turtles. The Fisheries Division is involved with an expanding beach monitoring program.

The beach-monitoring programme that started in 1991 in Antigua was extended to Barbuda in 1995. The beaches that are monitored in Antigua and Barbuda are shown in Figures 2 and 3. Twenty-five (25) beaches are measured (19 in Antigua, 6 in Barbuda) on the main islands. Additionally, monitoring was started on some offshore islands in 2003.

At the monitored beaches in Antigua, for the period 2001 – 2004, there was an average decrease in *profile area* (-4.27 m^2) while the *profile width* narrowed at an average rate of –0.45 m/yr (James in press 2005). In Barbuda (2000 – 2003) there was an overall increase, with average profile area and width of 3.73 m^2 and 1.57 m/yr, respectively. For both Antigua and Barbuda, (2000 – 2004) the profile area ranged from –47.27 m^2 to 78.78 m^2 while the profile width ranged from -4.42 m/yr to 9.79 m/yr (*ibid*). The information for individual beaches is shown graphically in Figures 4 to 7.

Coastal development, particularly in Antigua, continues to significantly determine the structure and configuration of the coastline. Based on past experiences, attempts have been made to maintain important coastal *ecosystems*, including *coral reefs*, *sea grass beds*, *beaches* and *wetlands*. Beach monitoring data have been considered in designing coastal development *setbacks* and a draft policy framework for the management of beaches in Antigua and Barbuda. In addition, critical recommendations have been made for the management of sand as a national, natural resource.

Although the beach-monitoring programme provides the mean conditions for the beaches around Antigua and Barbuda, the system can be improved if a wider variety of beaches are monitored with even greater precision and regularity. This will include the geo-referencing of the beach-monitoring sites, additional training in beach monitoring activities and the analysis of beach data, all of which will necessitate an increase of the resources of the Fisheries Division in Antigua. The capacity of the Fisheries Unit in Barbuda would also need to be expanded.

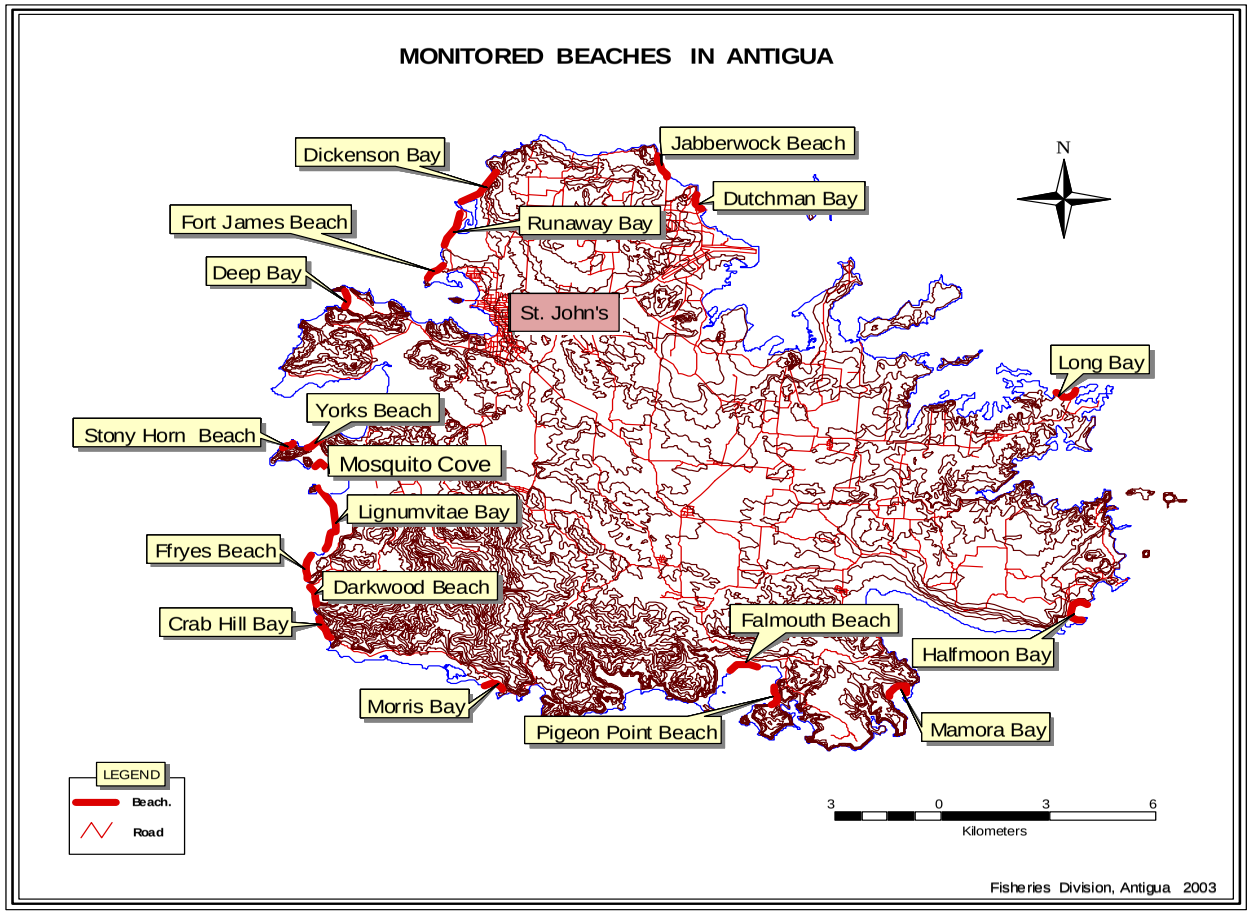


Figure 2. Monitored Beaches in Antigua.

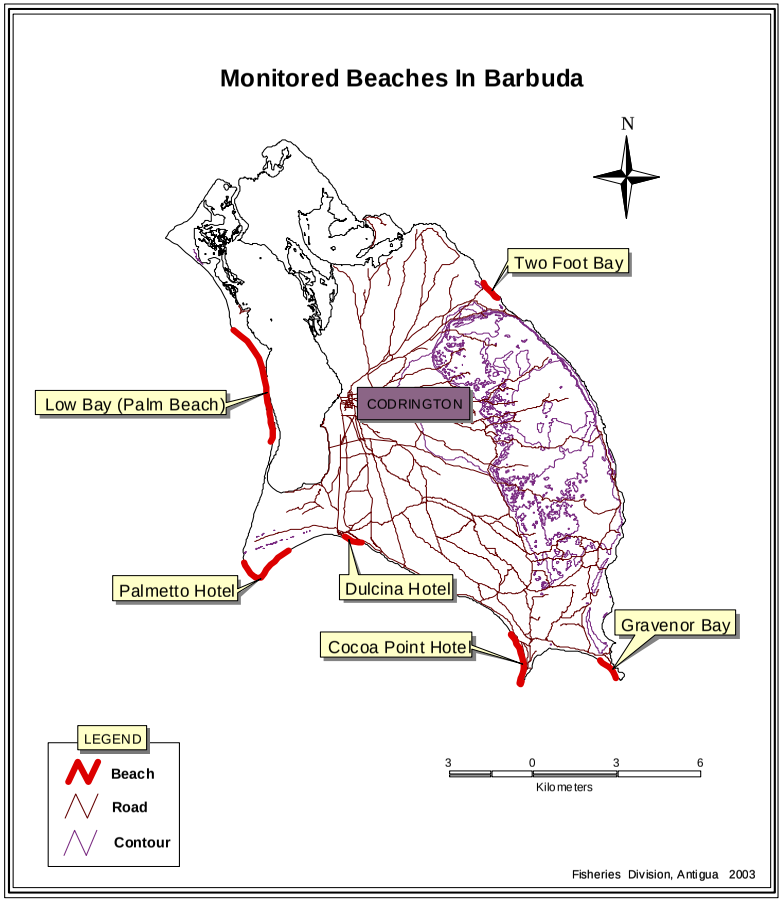


Figure 3. Monitored Beaches in Barbuda.

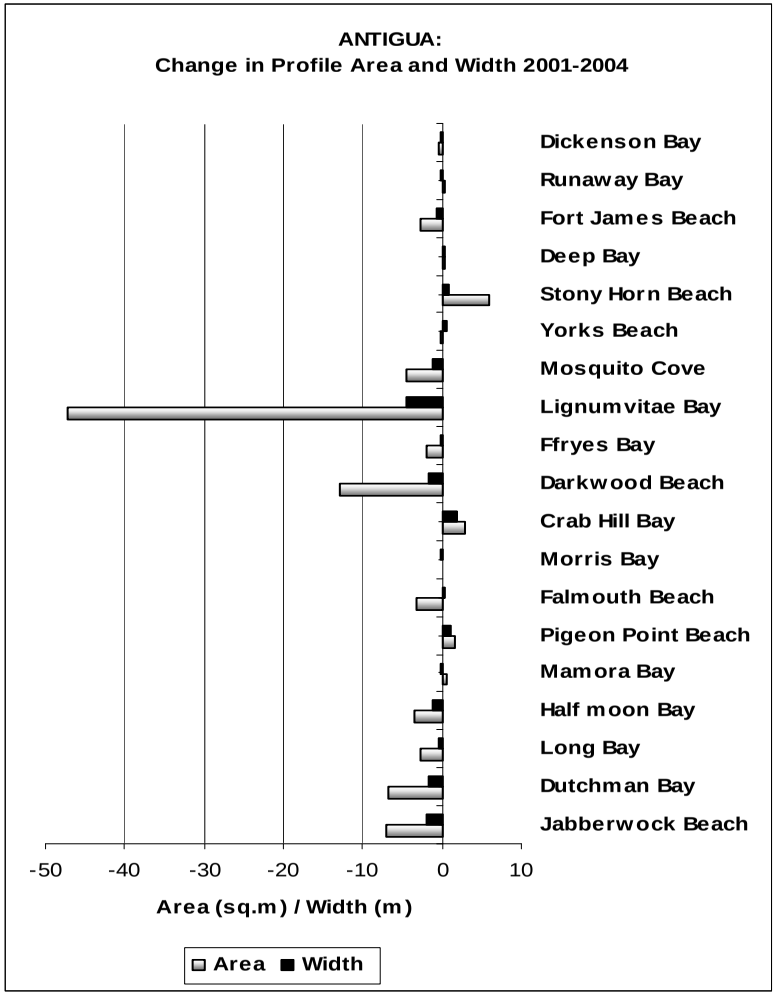


Figure 4. **Antigua: Change in Profile Area and Width 2001-2004 (James in press 2005).**

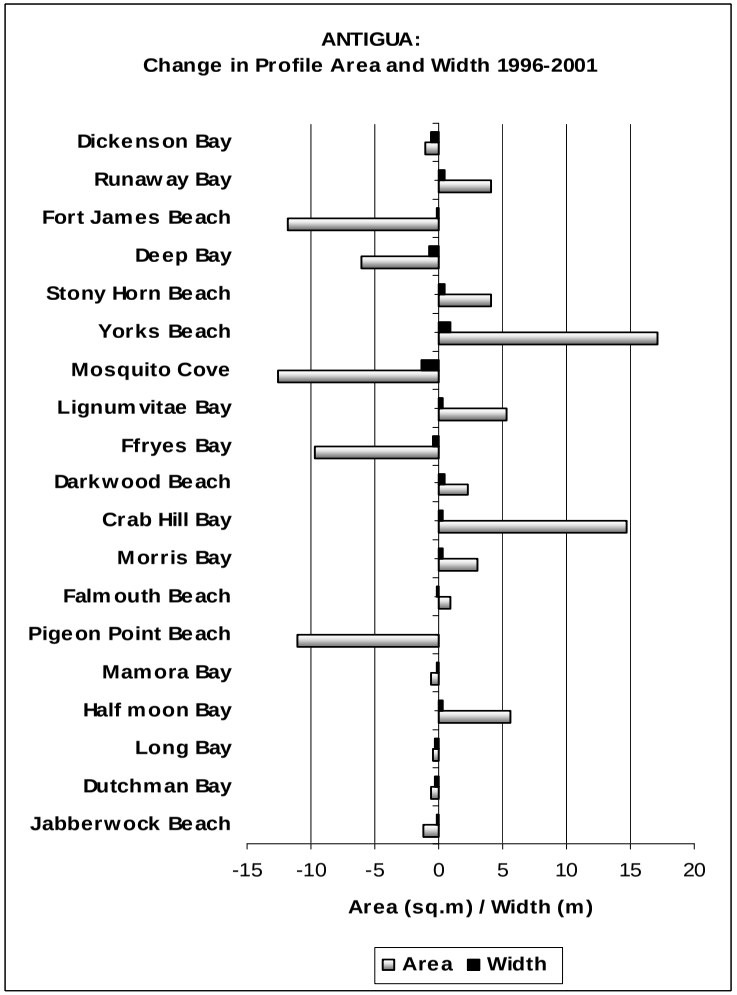


Figure 5. **Antigua: Change in Profile Area and Width 1996-2001 (James 2003).**

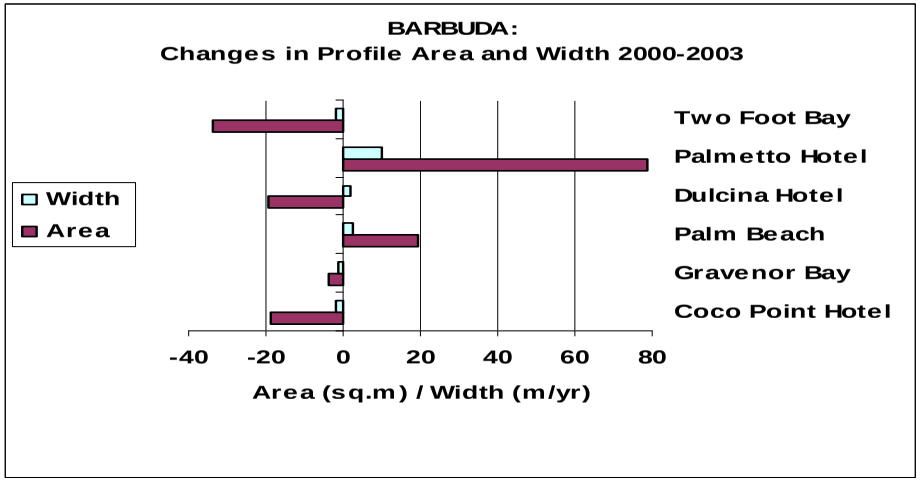


Figure 6. Barbuda: Change in Profile Area and Width 2000-2003 (James in press 2005).

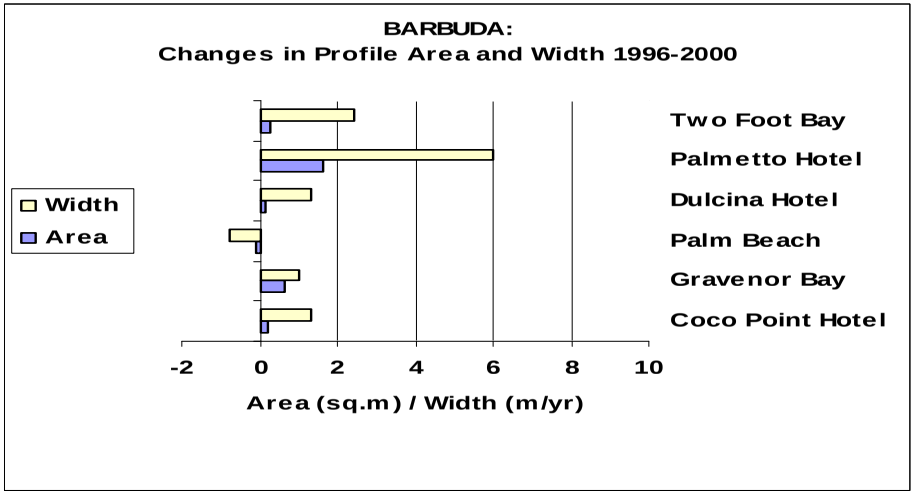


Figure 7. Barbuda: Change in Profile Area and Width 1996-2000 (James 2003).

Coral Reefs

Coral Reefs have for a long time been recognized for their importance to fisheries production. However, with limited information, planners have been left with few options for long-term management. The situation is further complicated because positive effects of sound planning often occur over years. Without immediate results, policy makers and the public often become impatient and question the effectiveness of long-term fisheries management. Such planning is however crucial for the sustainable management of the fisheries sector.

The emergence of Marine Protected Areas (MPAs) as a management tool has been gaining popularity in recent years. Although positive results have been demonstrated, the Fisheries Division is limited in its capacity to effectively manage such areas. The draft East Caribbean States Partnership Project (ECSPP) report notes "significant differences in the abundance of key fishery species in each sub-region of Antigua. This was most evident for groupers, which were only observed within the Cades Reef and Salt Fish Tail Sub-regions…" Both of these regions are MPAs. ECSPP is a pilot project for promoting a *"regional approach"* to the assessment and selection of coral reef marine protected area sites in the Eastern Caribbean States.

The use of MPAs, as well as the strengthening of current fisheries legislation will help to protect and preserve crucial coral reef habitats. The capacity of the Fisheries Division must also be increased to facilitate efficient effective management of the sector.

Marine Reserves

The creation of marine reserves is seen as an essential tool towards conservation and effective management of critical marine habitats. Areas already designated as marine reserves include Salt Fish Tail (Diamond Reef) and Cades Bay (in Antigua) and Palaster Reef (in Barbuda) (Figures 8 to 10). With assistance from the Organisation of Eastern Caribbean States – Environment and Sustainable Development Unit, the Fisheries Division is in the process of developing management plans based on a *"co-management approach"* with stakeholders. The Division recognises that a partnership with stakeholders, in all aspects of management, is the best approach towards effectively managing these reserves. In addition to these areas, Codrington Lagoon in Barbuda has been declared as a national park under the *National Parks Act (1984)*. The lagoon is vital to Barbuda's fisheries and tourism sector, since it serves as a nursery area for juvenile lobster and fish populations as well as an eco-tourism site; it houses one of the largest breeding colonies in the Caribbean for the frigate bird (*Fregata magnificens*). The North Sound Marine Reserve was proposed under the *Fisheries Act (1983)* in 2005 (Figure 11). It awaits approval.

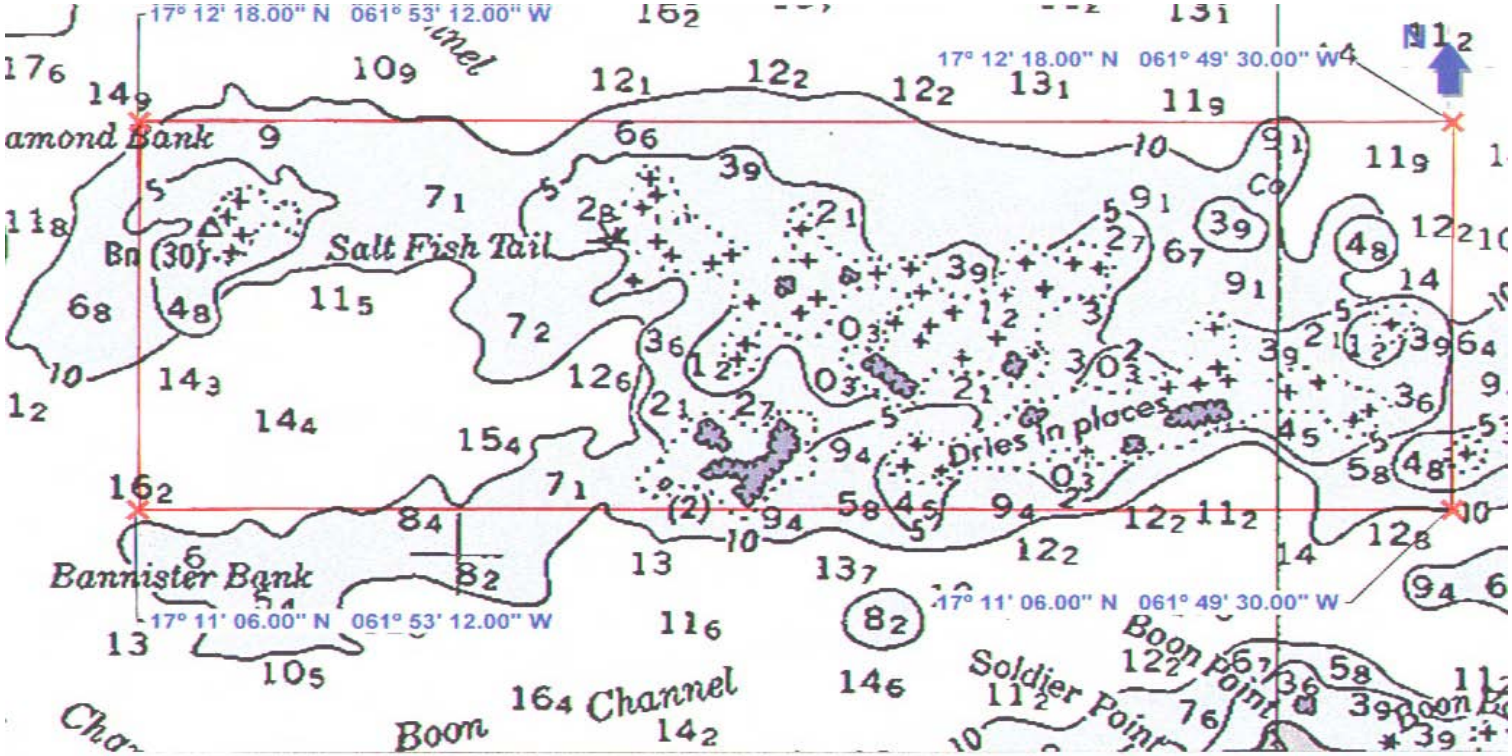


Figure 8. Salt Fish Tail (Diamond Reef) Marine Reserve, North Coast, Antigua (Source: DMA Chart M25570S0).

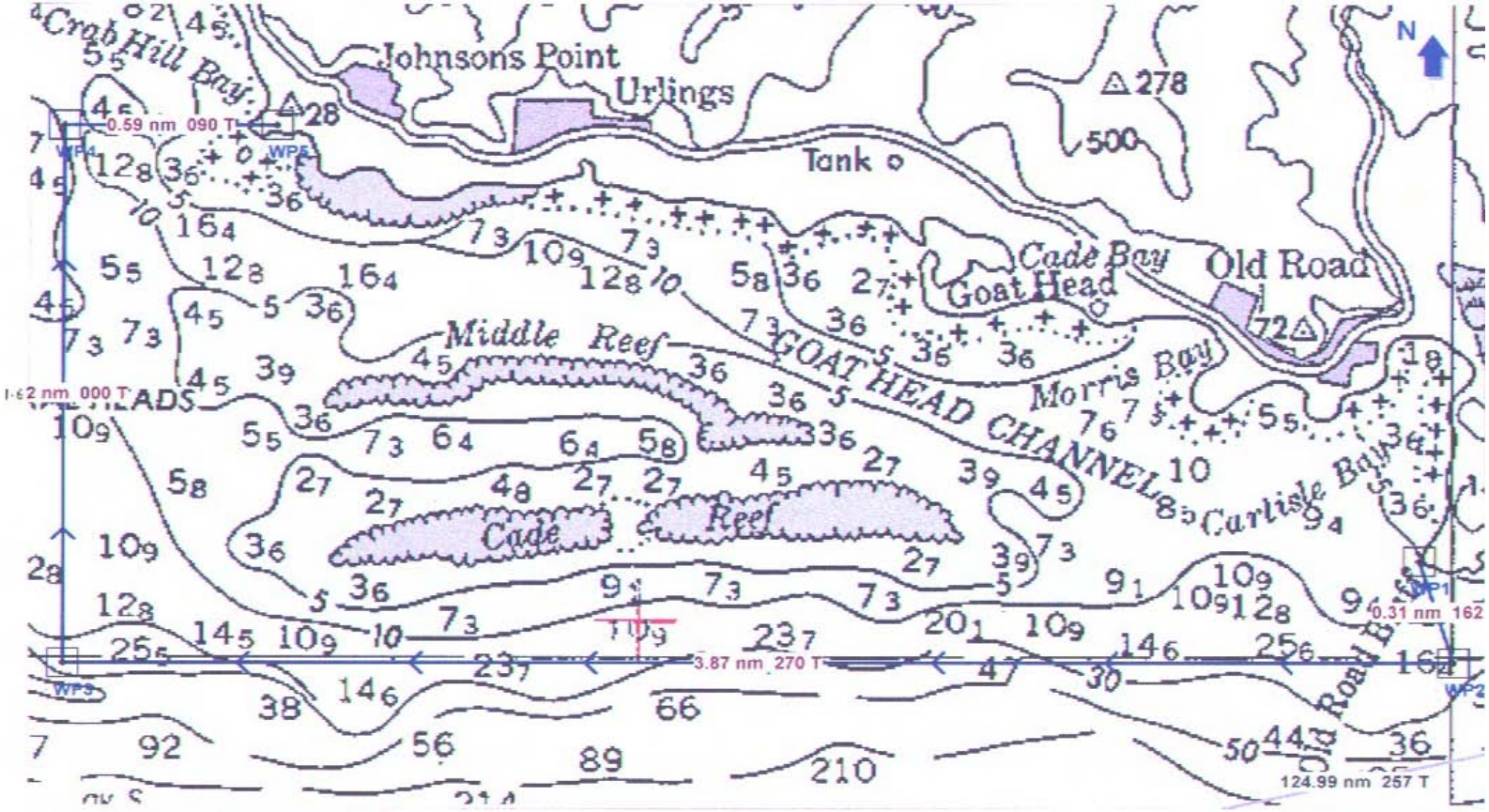


Figure 9. Cades Bay Marine Reserve, South Coast, Antigua (Source: DMA Chart M25570S0).

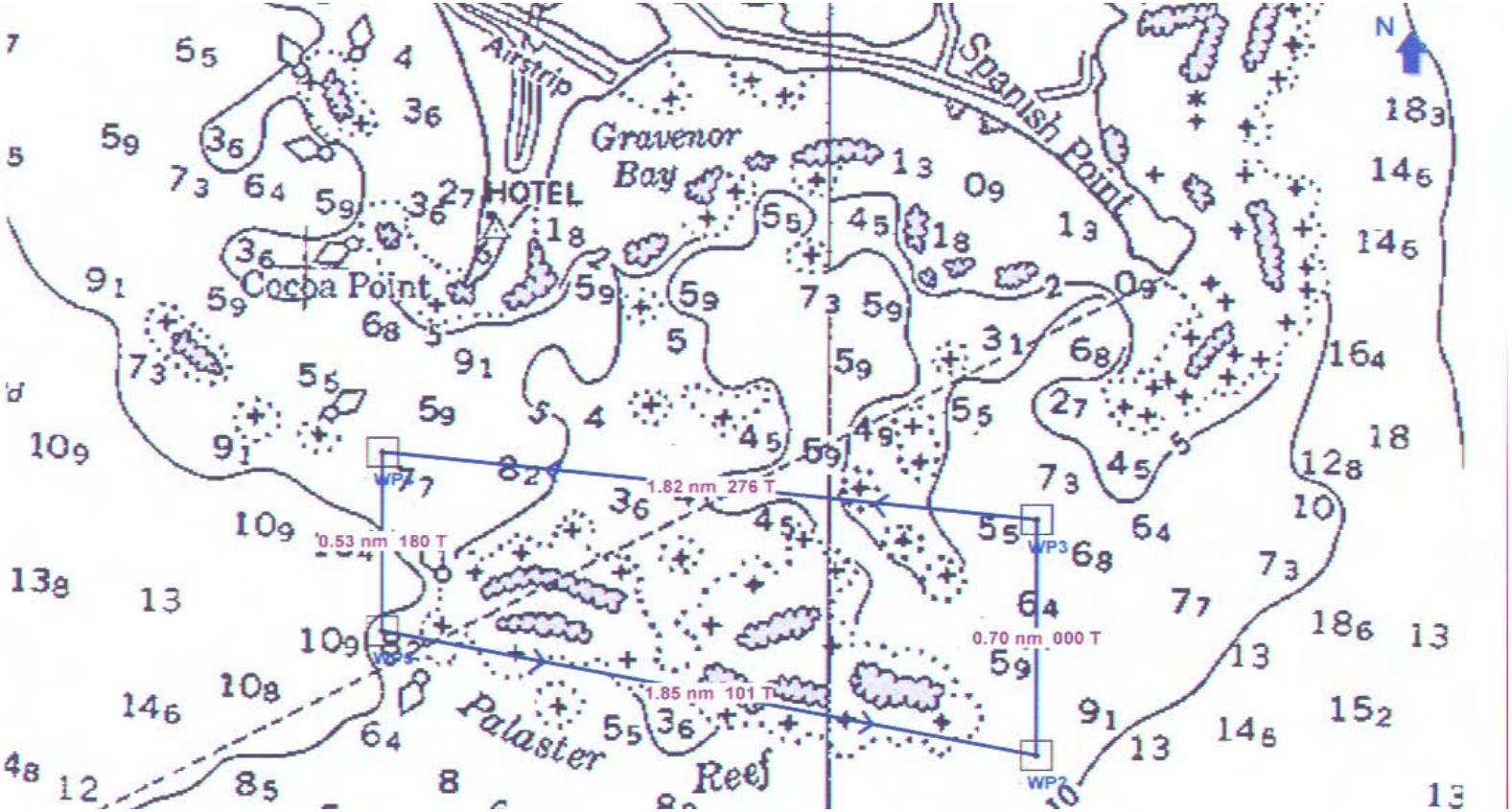


Figure 10. Palaster Reef Marine Reserve, South Coast, Barbuda (Source: DMA Chart M25570S0).

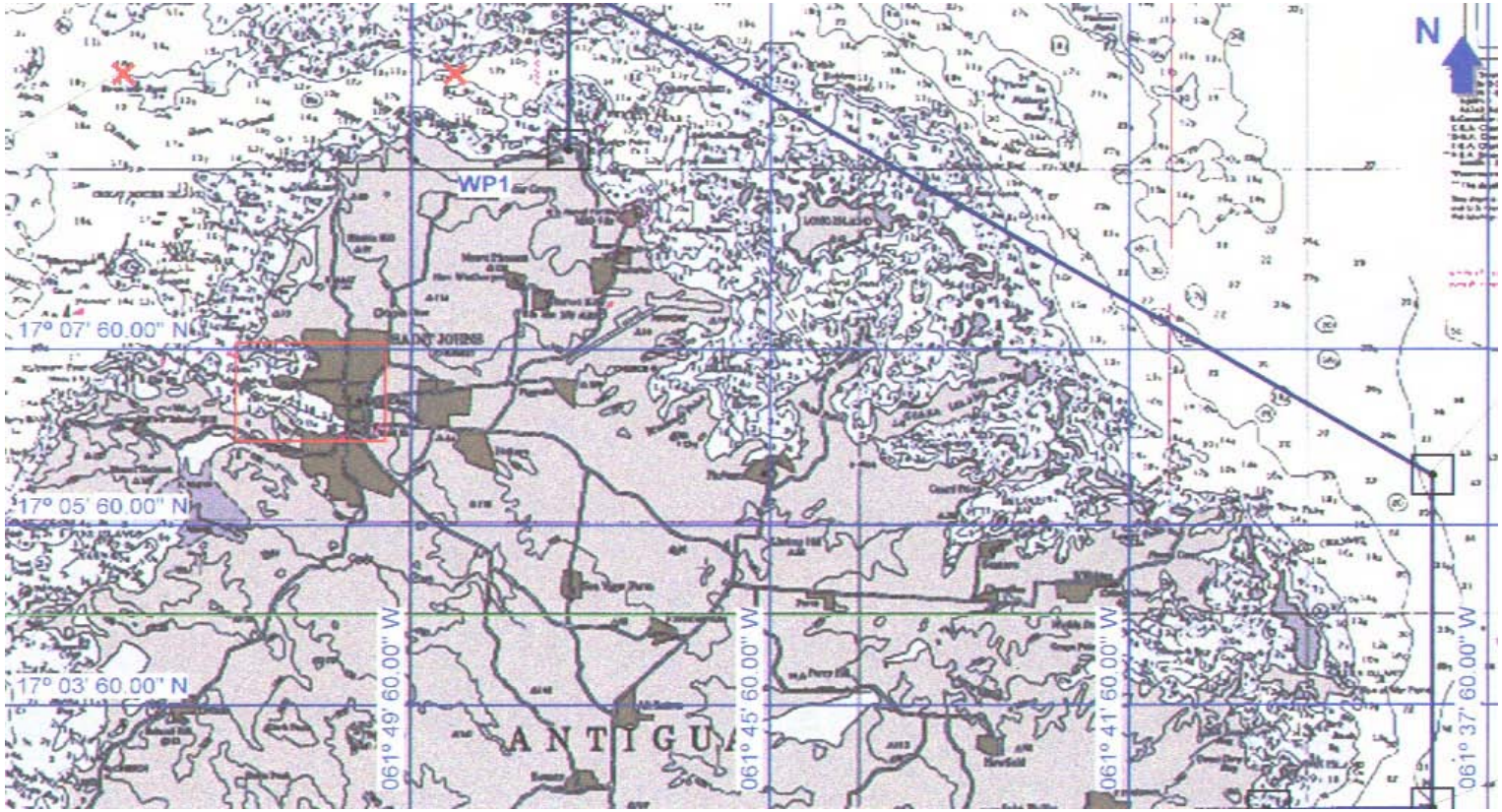


Figure 11. Proposed North Sound Marine Reserve, Antigua (Source: DMA Chart M25570S0).

Fishery Resources

Table 3 summarises the landings for the major fishery resources exploited in Antigua and Barbuda. In 2004, fisheries production was valued at EC$30 Million with the Caribbean spiny lobster contributing to 18% of the total value of production. Demersals or reef species account for at least 85% of capture production due to the fact most of the fishing activity take place on the extensive Antigua and Barbuda shelf. The total shelf area (3,568 km^2) is one of the largest in the Eastern Caribbean however it pales in comparison to the possible extent of the Exclusive Economic Zone (EEZ) and Fishery Zone (Figure 12). While the full extent of our EEZ has yet to be delimited, it offers vast potential for the development of a small-scale pelagic fishery.

In order to assess the status of the fishery resources, a data collection programme was initiated in 1995 under CARICOM Fisheries Resource Assessment and Management Program (CFRAMP). This includes monitoring the catch of fishing vessels as well as measuring samples of the catch (e.g., individual lengths and weights). The data obtained from this process allows fishery managers to track the changes in the fishery (whether stocks are decreasing or increasing in the relative sense) and assess the effectiveness of management measures. However because of the complexities involved in managing tropical multi-species fisheries, greater resources (in term of finance and trained individuals) will have to be allocated to the Fisheries Division in order to improve stock assessment and management of the various resources.

Table 3. Capture Production in Metric Tons (Live Weight) by Species Item for Antigua and Barbuda ("nei" – not elsewhere included).

Scientific Name	FAO Common Name	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Scombroidei	Tuna-like fishes nei	.	.	.	.	.	.	.	28	12	13	5
Osteichthyes	Marine fishes nei	1000	1116	1045	1242	1013	1041	1164	66	13	36	31
Panulirus argus	Caribbean spiny lobster	140	149	125	160	357	274	275	272	276	243	245
Strombus gigas	Queen conch	518	345	293	263	338	345	315	278	319	469	554
Coryphaena hippurus	Common dolphinfish								4	7	7	10
Elasmobranchii	Sharks, rays, skates nei								8	17	36	29
Ostraciidae	Boxfishes, trunkfishes nei								66	38	40	66
Acanthuridae	Surgeonfishes nei								158	237	196	141
Scaridae	Parrotfishes nei								173	252	254	225
Lutjanidae	Snappers, jobfishes nei								284	348	341	411
Serranidae	Groupers, seabasses nei								217	364	352	398
Haemulidae	Grunts, sweetlips nei								167	259	212	184
Holocentridae	Squirrelfishes nei								29	45	54	13
Balistidae	Triggerfishes, durgons nei								18	83	143	89
Kyphosidae	Sea chubs nei								8	4	10	6
Sparidae	Porgies, seabreams nei								9	15	35	16
Sphyraena spp	Barracudas nei								6	8	26	33
Carangidae	Carangids, jacks nei								33	34	85	65
Pomacanthidae	Angelfishes nei									28	12	4
Monacanthidae	Filefishes nei									15	23	2
Total		**1658**	**1610**	**1463**	**1665**	**1708**	**1660**	**1754**	**1824**	**2374**	**2587**	**2527**

Note: Capture production for Scombroidei, Coryphaena hippurus, Elasmobranchii and Sphyraena spp. are low-end estimates (present data collection programme has limited coverage of the recreational or sport fishery).

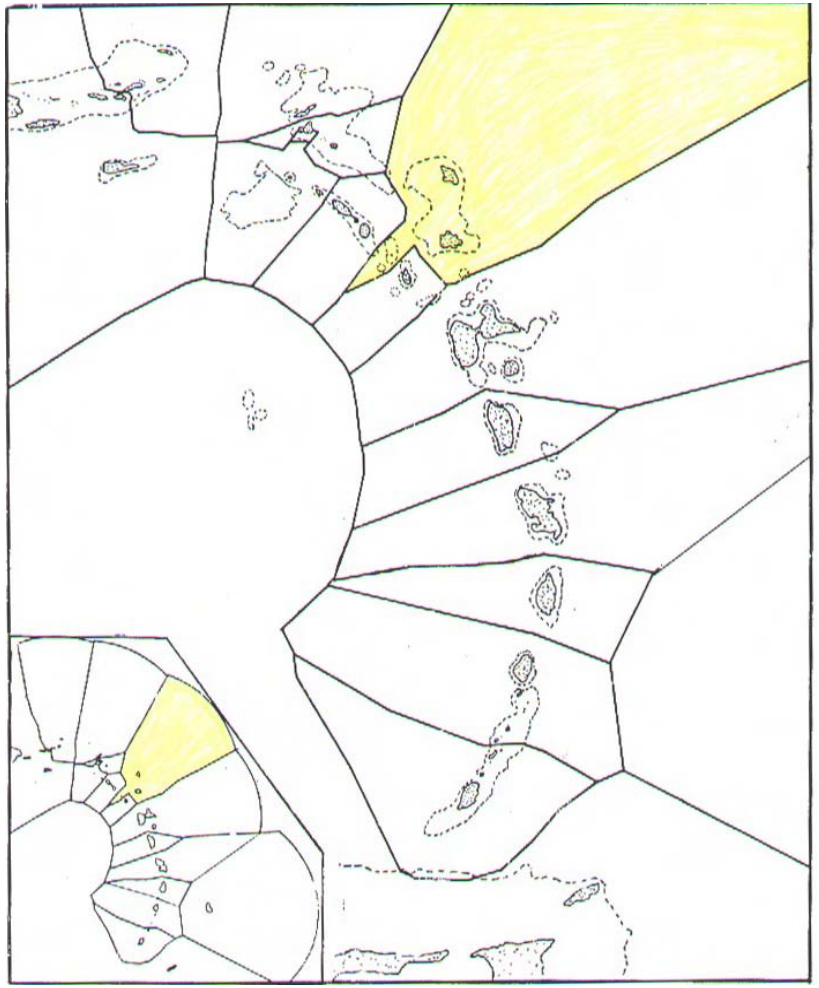


Figure 12. **EEZs of the Lesser Antilles sub-region, based on the equidistance principle, take from a map prepared by the Dalhousie Ocean Studies Program, Dalhousie University, Halifax (Antigua and Barbuda in yellow).**

Shallow Shelf and Reef Fishes

The shallow shelf and reef fishes consist of species associated with coral reefs. These include Grunts (Haemulidae), Parrotfishes (Scaridae), Hinds (Serranidae), Surgeonfishes (Acanthuridae), Porgies (Sparidae), Boxfishes (Ostraciidae), Triggerfishes (Balistidae) and Squirrelfishes (Holocentridae). These species are caught primarily by traps, gill nets and hand lines on the insular shelf. Conservative estimates of potential yield range from 1,571 to 1,784 metric tons per year. Present production is at or below these levels, however stocks may be fished at their maximum sustainable level when one considers the errors associated with the estimates.

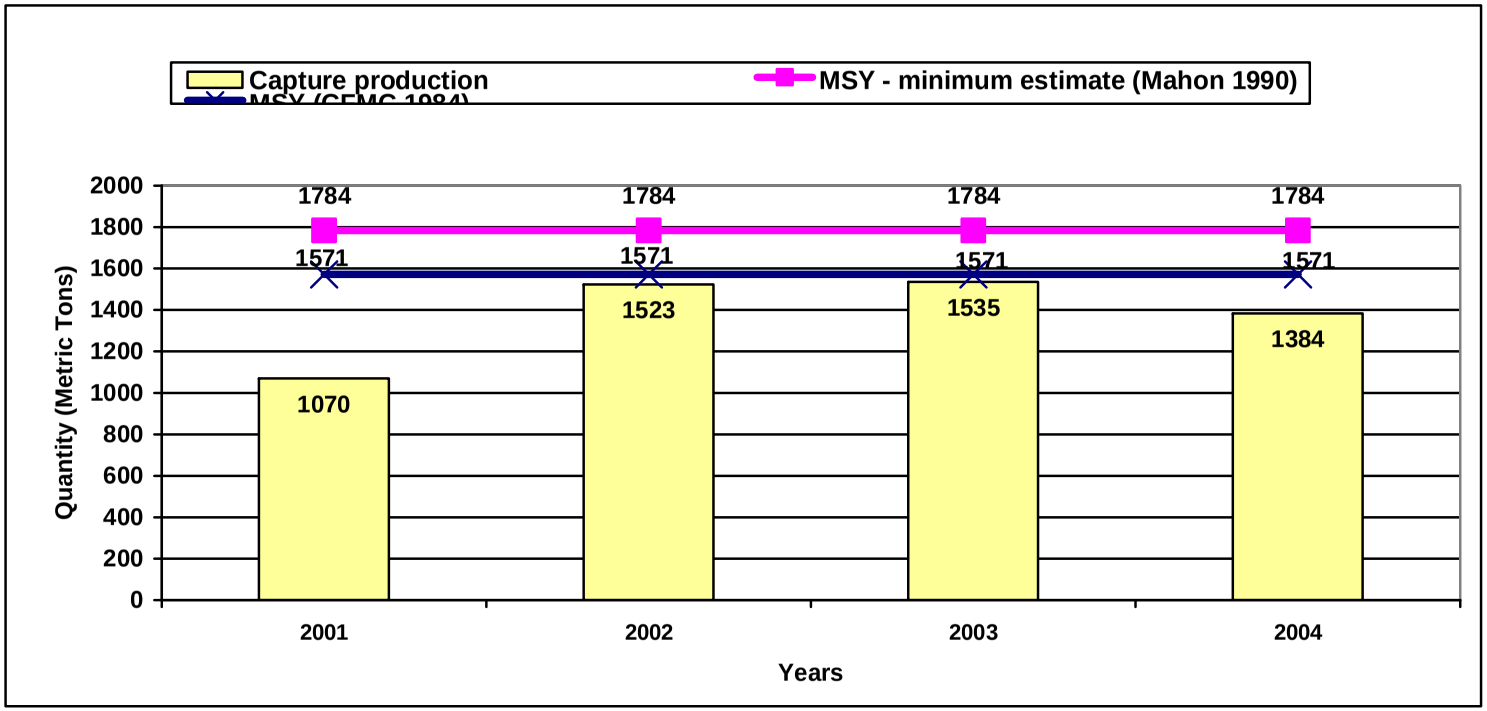


Figure 13. Capture Production and Maximum Sustainable Yield (MSY) Estimates for Shallow Shelf and Reef Fishes in Antigua and Barbuda. Yield estimates are based on extrapolation from areas outside Antigua and Barbuda waters hence values should be viewed with caution.

Deep Slope Fishes

Figure 14 summarises capture production and potential yield estimates for deep slope fishes, mainly deep-water Snappers (Lutjanidae) and Groupers (Serranidae). Capture production estimates of the deep-water Snappers and Groupers are based on the assumption that 25% of all Snappers and Groupers captured were from the deep slope (Table 3). Estimates of maximum sustainable yield fall above and below present level of production. The deep slope fishes are vulnerable to over-exploitation due to the small areas on the slope of the shelf and banks where they occur. Traps are set on the slope in depths of about 200 metres to harvest these resources.

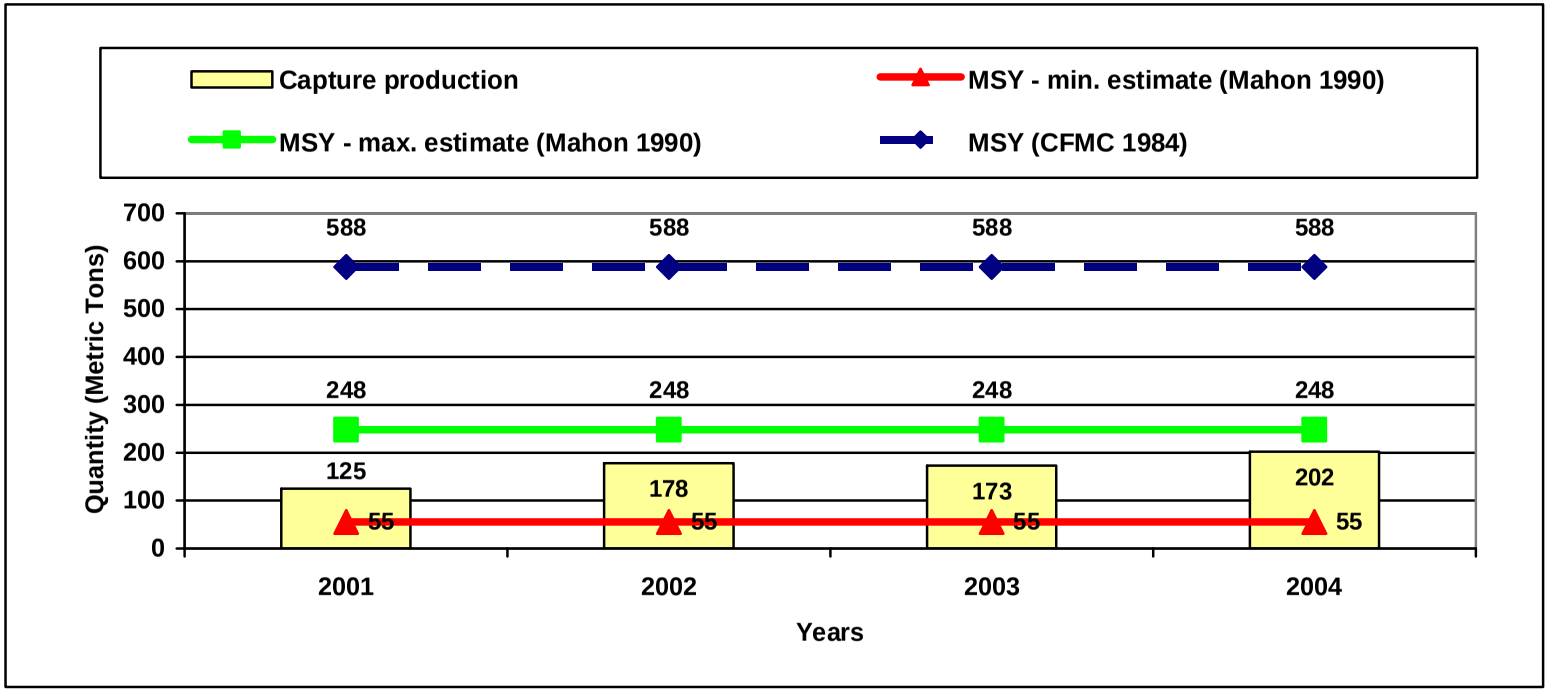


Figure 14. Capture Production and Maximum Sustainable Yield (MSY) Estimates for Deep Slope Fishes (Deep-water Snappers and Groupers) in Antigua and Barbuda. Potential yield estimates are based on extrapolation from areas outside Antigua and Barbuda waters hence values should be viewed with caution.

Figure 15 summarises capture production for all Snappers (Lutjanidae) and includes an estimate of the maximum sustainable yield. In 2004, the Snapper fishery was valued at EC$6.3 Million and contributed to 21% of the total retail value of production. It is the most lucrative finfish fishery. In a close second, Groupers (Serranidae) landings was valued at EC$5.3 Million or 18% of the total value of production. Grouper species are highly vulnerable to over-exploitation due to the fact that spawning aggregations can be easily targeted. Spawning takes place during one period of the year between the months of November to February, unlike species such as the Parrotfish (Scaridae), which reproduces with certain peaks year round.

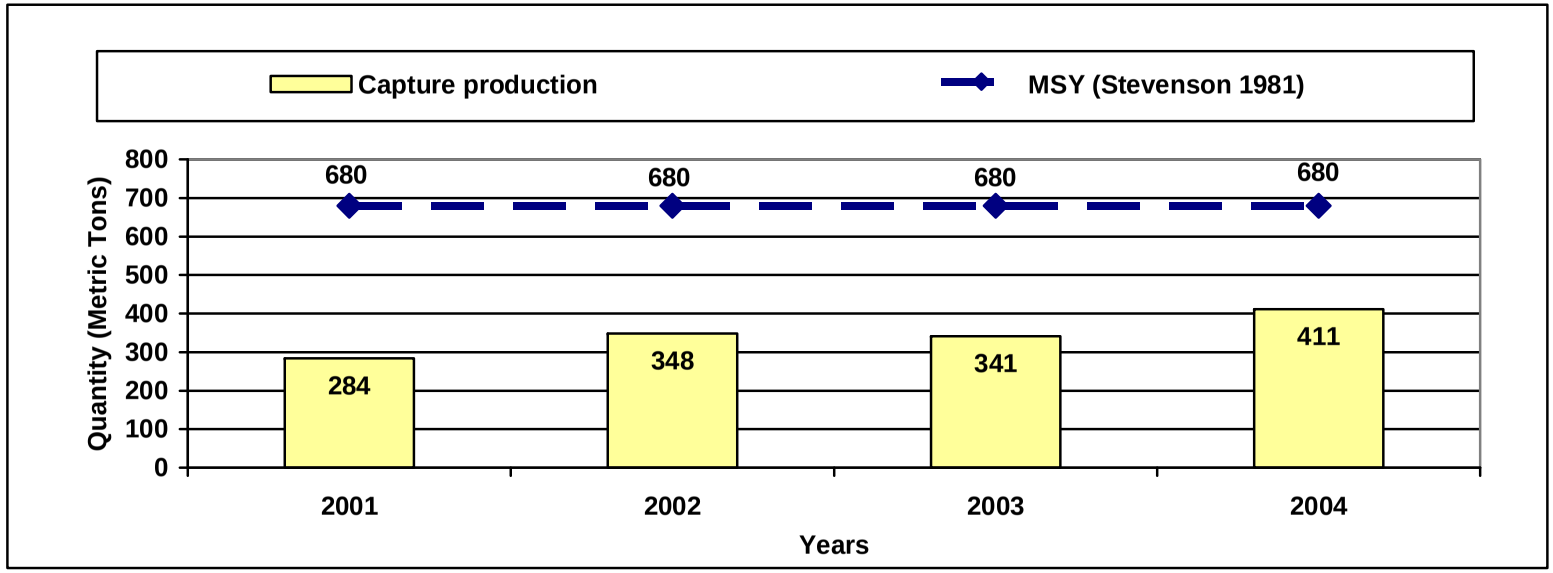


Figure 15. Capture Production and Maximum Sustainable Yield (MSY) Estimate for Snappers in Antigua and Barbuda. Potential yield estimate is based on extrapolation from areas outside Antigua and Barbuda waters hence value should be viewed with caution.

Coastal Pelagic Fish

Coastal pelagics include Jacks (Carangidae), Ballyhoo (Hemiramphus spp.), Herrings (Clupeidae), Scads (Decapterus spp.), Sennets (Sphyraena spp.), Bonefishes (Albulidae) and small tunas. In recent times fishers have not focused on this fishery. The principle gear employed to catch coastal pelagics includes cast nets, beach seine and ballyhoo net. In recent time, the use of the beach seine has become rare. Currently there is only one beach seine in operation in Antigua. Coastal pelagics such as the Ballyhoo and Herring are mainly used as bait in the large pelagic fishery.

Anecdotal evidence from fishers suggests that these resources are moderately exploited. Lack of data on the resources precludes the estimation of potential yields.

Large Pelagic Fish

Large pelagic species include Tunas (Scombridae), Dolphinfish (*Coryphaena hippurus*), Wahoo (*Acanthocybium solandri*) Billfish (Istiophoridae), Swordfish (*Xiphius gladius*) and Sharks (Elasmobranchii). These large pelagics migrate through Antigua and Barbuda's waters and are harvested mainly by the sport and recreational fishery and to a small extent by fishing charter boat services.

The migratory nature of these species makes regional management necessary. The International Commission for the Conservation of Atlantic Tuna (ICCAT) provides an annual review of these stocks. According to these reviews most of the larger pelagic are over-exploited. These include the Yellowfin tuna, Albacore and Skipjack tuna.

Catches of the large pelagic are seasonal. Conservative estimates of capture production range from 15 to 32 metric tons (not including sharks) (Figure 16). The status of some species is unknown however certain species are believed to be adequate enough to allow for an expansion of this fishery in Antigua and Barbuda. Figure 16 provides potential yield estimates for various species; estimates for individual species are well above what is landed for the entire group (Scombroidei and *C. hippurus*) on an annual basis.

In order to participate in the regional management of these resources, the current data collection programme will have to be upgraded to improve monitoring of these resources. In the long term, the Government of Antigua and Barbuda may have to consider membership in ICCAT if it intends to utilise its "fair share" of the resource.

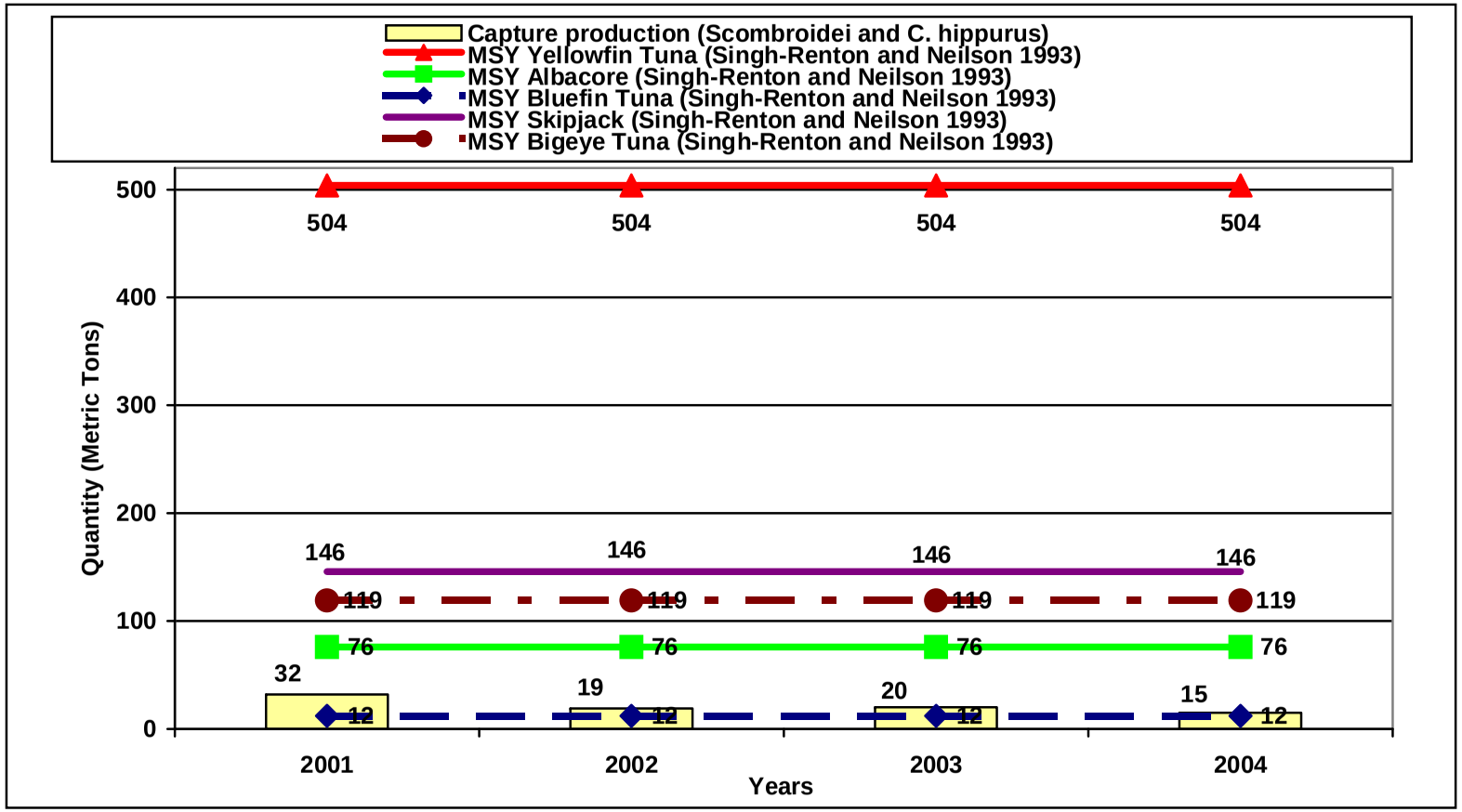


Figure 16. **Capture Production for Large Pelagics (Dolphinfish, Tunas and Tuna-like Fishes) and Maximum Sustainable Yield (MSY) Estimates for Ocean-wide Large Pelagics within the Marine Area of Antigua and Barbuda. Potential yield estimates are based on extrapolation from areas outside Antigua and Barbuda waters hence values should be viewed with caution.**

Caribbean Spiny Lobster

The Caribbean spiny lobster (*Panulirus argus*) is the most valued fishery in Antigua and Barbuda. The Spotted spiny lobster (*Panulirus guttatus*), the Smooth-tailed spiny lobster (*Panulirus laevicauda*) and Slipper lobster (*Scyllarus spp*.) are occasional landed, but are not as commercially significant.

There are 155 vessels that target both reef fish and Spiny lobster commercially in Antigua. Vessels range from small pirogues to large fibreglass launches, with the latest fishing equipment (depth sounder, trap haulers, etc.). Vessels that fish for lobster in Antigua, account for about 63.3% of the active fishing fleet of 245 vessels (Horsford 2004 a). There are about 384 fishers employed in this sub-sector. Typical investment cost, including vessel, gear and fishing equipment, range from EC$ 37,000 for a 22 ft. fibreglass pirogue to EC$ 197, 000 for a 38 ft. fibreglass launch (*ibid*.).

In Barbuda, the Spiny lobster is the principal species of commercial interest. The fishery supports about 90 fishers operating from 47 vessels. Approximately 26% of the population of Barbuda are directly dependent on this fishery (Horsford 2000). It also offers the highest per capita earnings (Van der Meerin 1998) and it one of the main economic activities in Barbuda.

The lobster fishery of Antigua and Barbuda is valued at about EC$2.8 – 7.9 Million. Estimates for Barbuda, range from EC$1.0 – 2.1 Million per annum, emphasising its importance to residents of Barbuda. As is evident from Figure 17, production has been fairly constant over the past six years (between 243 to 276 metric tons). Maximum sustainable yield estimates for the Caribbean spiny lobster range from 178 to 1,918 metric tons per annum. This is at or well above the current level of production.

Table 4 summarises biological data collected for the Caribbean spiny lobster. Estimates of the non-compliance rate, ranged from as low as 12.5% to as high as 39.3% (Horsford 2004 a). A level of non-compliance above 15% is cause for concern, since it indicates that a substantial proportion of individuals have not had the opportunity to reproduce at least once. In all cases, the average carapace length was significantly greater than the minimum legal size (9.5 cm) and no negative trend was observed with respect to the carapace length, suggesting relatively health stocks (*ibid*.). Spiny lobster normally matures between 3 to 5 years, when the carapace or “back” is about 9.5 cm in length. Based on the data collected, the majority of samples appear to be older than 3 years. Stocks are though to be sustainable at the current level of fishing. However, a greater effort has to be made to reduce the landings of undersize lobsters to levels below 15%.

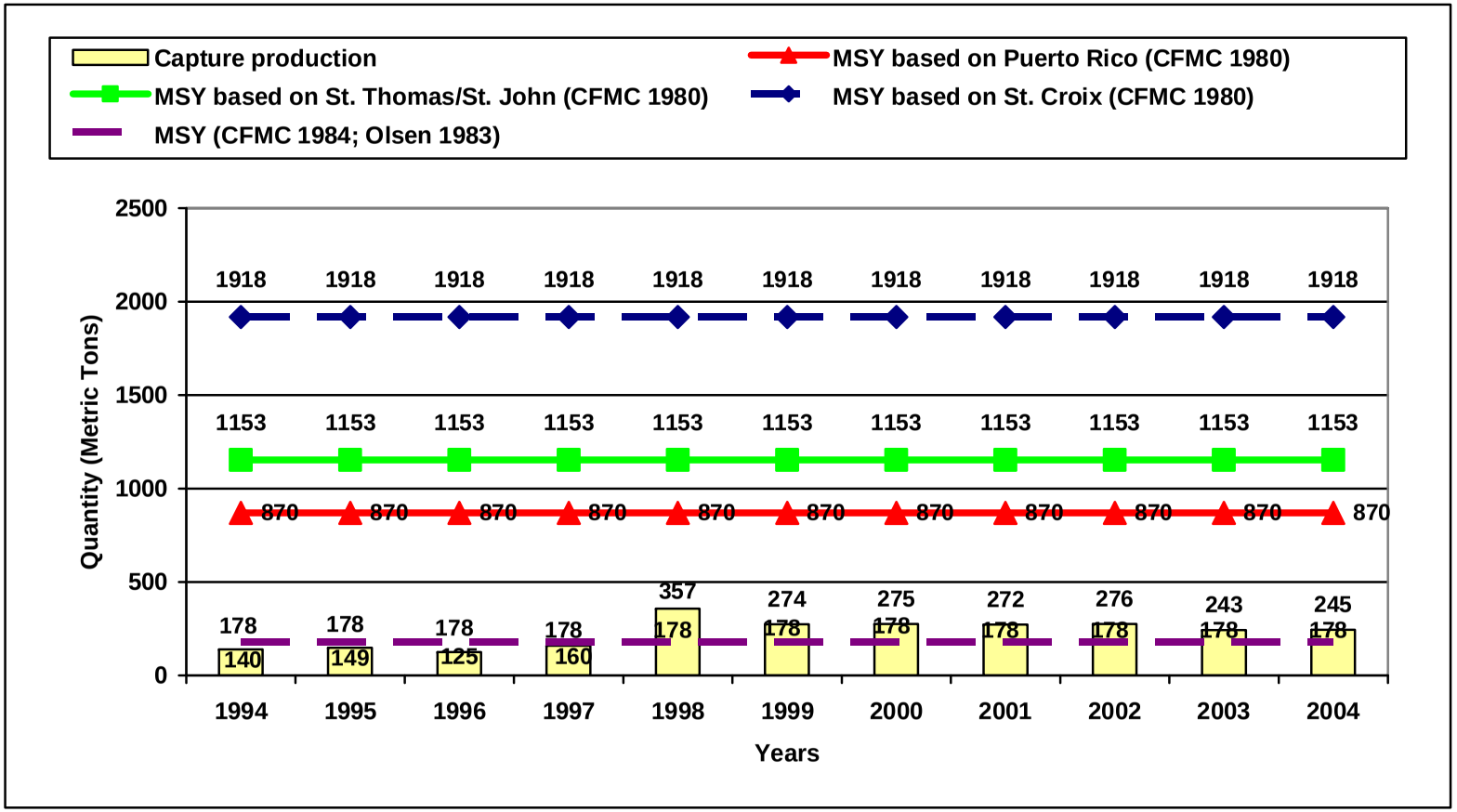


Figure 17. **Capture Production and Maximum Sustainable Yield (MSY) Estimates for Caribbean Spiny Lobster in Antigua and Barbuda. Potential yield estimates are based on extrapolation from areas outside Antigua and Barbuda waters hence values should be viewed with caution.**

Table 4. **Summary of biological data for Spiny lobster collected from fishing vessels in Antigua and Barbuda (Horsford 2004 a).**

Year	Sample Size	Carapace Length (cm)		Minimum Carapace Length (cm)	Samples Undersize (%)
		Average	Standard Deviation		
1996	709	10.5	1.6	9.5	28.8%
1997	374	10.1	1.7	9.5	39.3%
1998	283	10.4	1.3	9.5	22.3%
1999	284	10.3	1.4	9.5	32.0%
2001	247	10.7	1.7	9.5	26.7%
2002	220	10.8	1.6	9.5	19.1%
2003	112	11.3	1.7	9.5	12.5%

Queen Conch

The Queen conch (*Strombus gigas*) is considered one of the most valuable and important fishery resources. It is second only to the Caribbean spiny lobster in terms of retail value. The conch is most common in shallow waters (not exceeding 30 m), a factor that contributes to its vulnerable to fishing. In 2004, the retail value of the fishery was EC$1.3 Million, emphasising its importance to the southern villages of Urlings and Old Road, where most conch fishers reside. This is approximately EC$2,060 per annum for each private household in the area (Horsford 2006). The fishery employs some 40 individuals including 20 SCUBA divers. The Queen conch is under-exploited in Barbuda; fishers target primarily the Spiny lobster.

Figure 18 summarise landings for the resource and estimates of the potential yield. In all cases, potential yield estimates were at least three times the quantity of landings. However, because estimates were not site-specific, caution should be applied with respect to increasing fishing effort.

Table 5 summarises biological data collected for the Queen conch. Estimates of the non-compliance rate ranged from as low as 1.3% to as high as 20.7% (Horsford 2004 b). In all cases, the average meat weight was significantly greater than the minimum legal weight (225 grams), indicating that most fishers were targeting adult conch. Conch normally matures at about 3 years, when the shell outer pink lip is completely formed. Based on the data collected, the majority of samples were older than 3 years. Overall stocks are though to be relatively healthy and sustainable at the current level of fishing (*ibid*.), although certain areas are considered over-exploited based on an abundance survey carried out on the southwest coast of Antigua in 1999 (Tewfix et al. 2001). Historically, this area was once the main area of commercial fishing activity. In response to fishing pressures and the need to protect critical habitats, the Cades Bay Marine Reserve was established in 1999. The area includes Cades Reef and extends landward to include critical nursery areas ranging from mangroves to sea-grass beds.

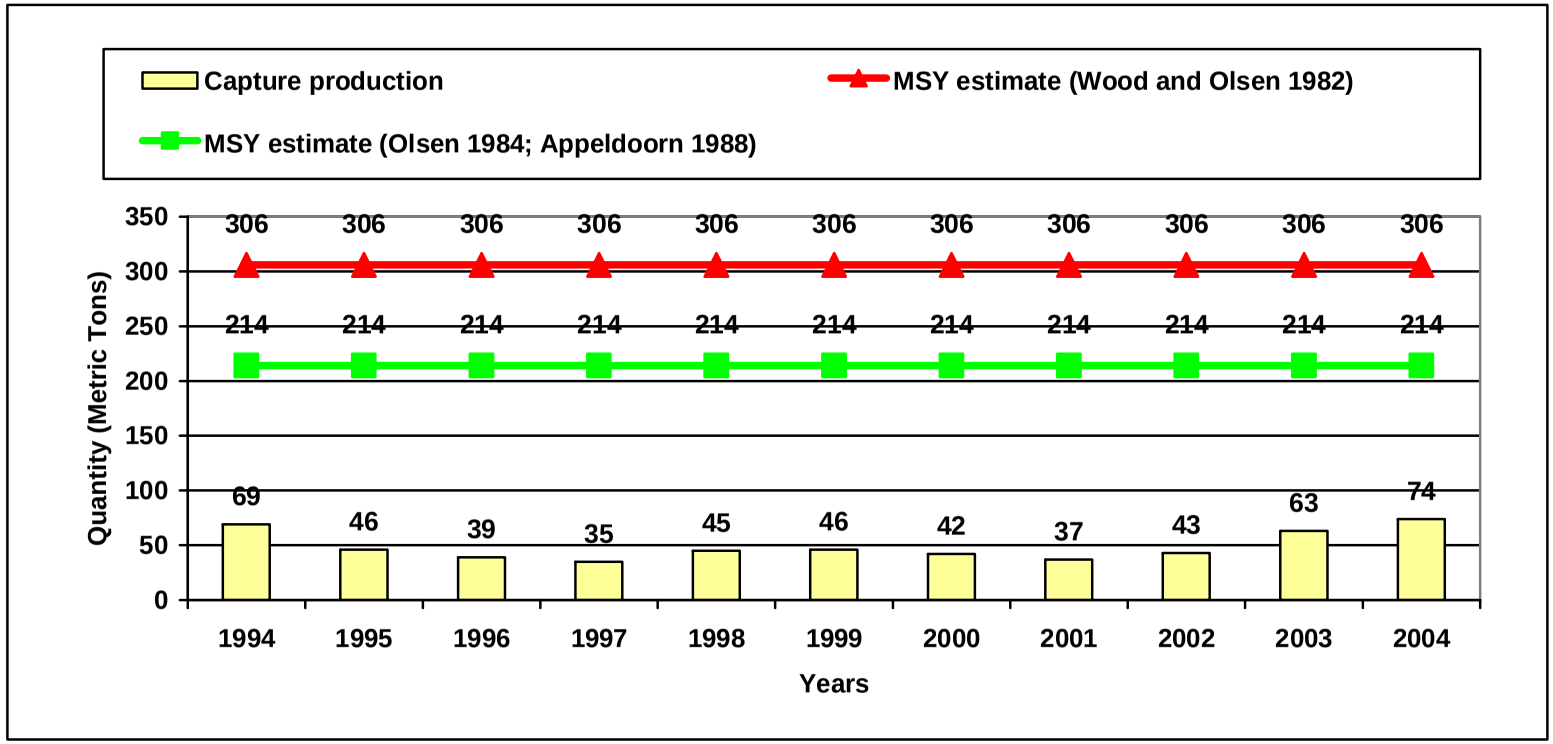


Figure 18. **Capture Production (in marketable meat weight – digestive glands removed) and Maximum Sustainable Yield (MSY) Estimates for Queen Conch in Antigua and Barbuda. Potential yield estimates are based on extrapolation from areas outside Antigua and Barbuda waters hence values should be viewed with caution.**

Table 5 **Summary of biological data for Queen conch collected from SCUBA-fishing vessels in Antigua (Horsford 2004 b).**

Year	Sample Size	Meat Weight (grams)		Minimum Legal Weight (grams)	Percentage of Sample Below Legal Weight
		Average	Standard Deviation		
1999	155	348.3	60.7	225	1.3%
2001	73	294.8	73.2	225	16.4%
2002	176	309.2	80.0	225	11.9%
2003	246	288.6	72.0	225	20.7%
Oct. 2004	434	317.6	74.9	225	8.5%

Sharks

Shark resources are generally considered to be under-exploited in Antigua and Barbuda. Annual capture production ranges from 8 to 36 metric tons while potential yield is estimated at 69 metric tons (Figure 19). This supports the case for increase utilisation, possibly as a value-added product. The Fisheries Division has done experimental salting of shark. The reception from the general public regarding the product was quite favourable.

Sharks have a relatively low reproductive potential, slow growth rates, and greater age-at-maturity than other fishery stocks. As a result, sharks are particularly vulnerable to over-exploitation. This is also true for skates and rays. With this in mind, any increase in fishing effort should be approached with caution.

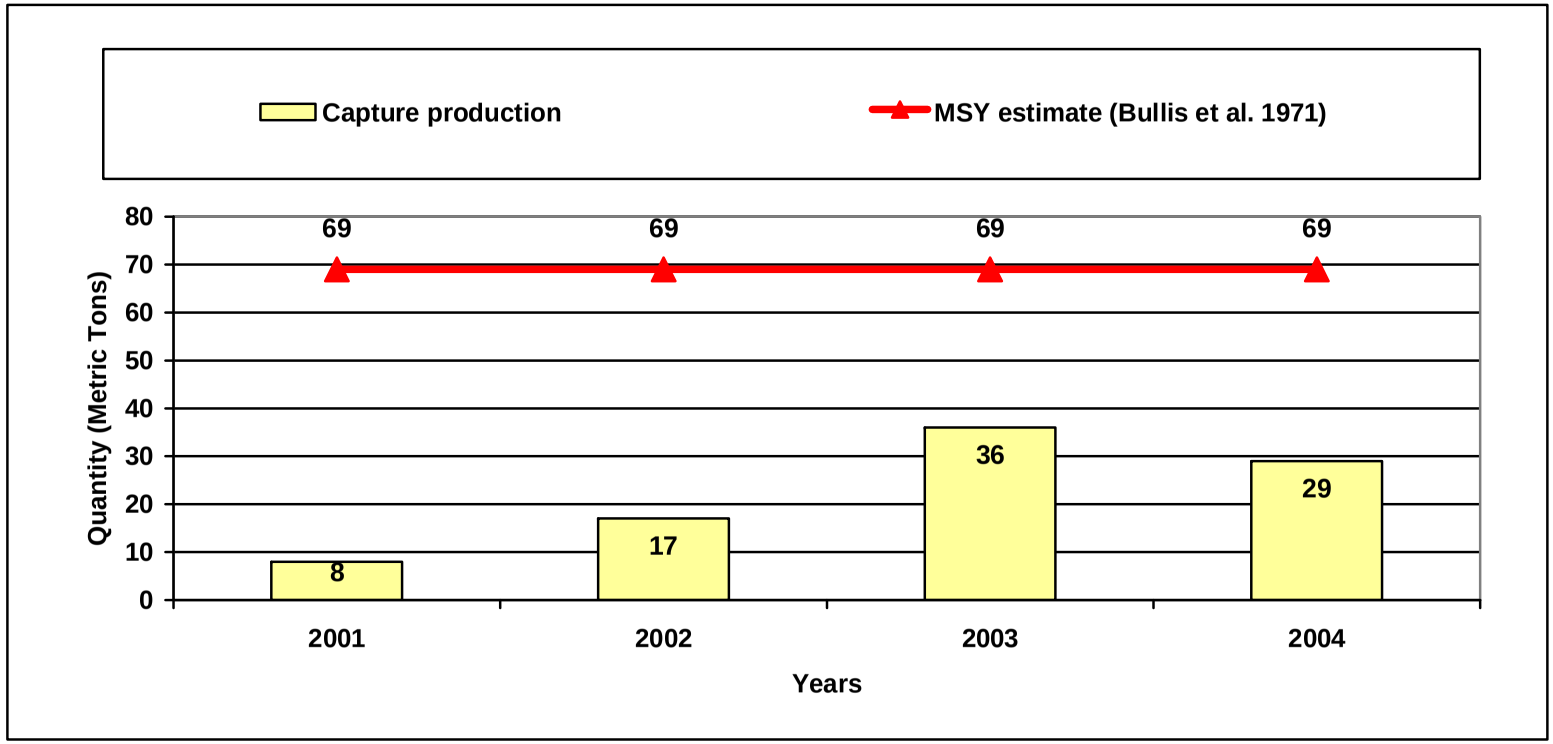


Figure 19. **Capture Production for Elasmobranchii (Sharks, Rays, Skates, etc.) and Maximum Sustainable Yield (MSY) Estimate for Sharks in Antigua and Barbuda. Potential yield estimate is based on extrapolation from areas outside Antigua and Barbuda waters hence value should be viewed with caution.**

Algae

Various species of edible algae occur in the region (e.g., *Eucheuma* and *Gracilaria sp*). Locally referred to as "sea moss", *Gracilaria* species have been traditionally harvested and consumed in a milky concoction laced with spices. An international market exists for algal gels (agar and carrageenin) however no feasibility assessment has been done.

Gracilaria have been cultured successfully in Antigua. Various products on the market include bottled and canned concentrates as well as dried sea moss (Figure 20). Issues affecting the development of the industry include: cost of importing beverage bottles and bottling; legal requirements for marketing and exporting food products; and identification of product ingredients and correct labelling.

Figure 20. Various Sea Moss Products (Courtesy "Soca Sea Moss").

Bivalves

Bivalves (locally referred to as “cockle”) can be considered a local delicacy. Traditionally, there has been subsistent harvest of bivalves from various seagrass beds and wetland areas around Antigua and Barbuda (e.g., Willoughby Bay, Blackmans Point, Parham, Cherry Hill Bay and Pinching Bay). Species that are harvested include Tiger lucine (*Codakia orbicularis*) and Pennsylvania lucine (*Lucina pensylvanica*). The Tiger lucine can be found in sand between depths of 0.5 and 6 metres.

In recent times, a small semi-commercial fishery for bivalves has emerged. The lucine clam (*Lucina pensylvanica*) fishery was valued at EC$140,000 in 2001. Sixteen metric tons (live weight) was harvested. Because of the vulnerability of these resources to over-exploitation, the Fisheries Division is looking at introducing sustainable management measures. Abundance and potential yields for this species have yet to be determined.

Cephalopods

Octopus and squid are harvest occasionally at a subsistence level. In most cases, squid is caught primarily for bait.

Both octopus and squid are considered under-exploited and have considerable potential for local use as bait and as well as for export to the French territories. Guadeloupe and Martinique have a strong culture of consumption.

In 2001, exploratory fishing trips by the Fisheries Division in conjunction with Japanese experts, yielded favourable catches with respect to Diamondback (*Thysanoteuthis rhombus*) and Neon flying squid (*Ommastrephes bartrami*) (Figure 21).

Figure 21. **Diamondback (*Thysanoteuthis rhombus*) and Neon Flying Squid (*Ommastrephes bartrami*) Caught during Exploratory Fishing Trip in 2001 (Fisheries Officer, George Looby, in photo).**

Whelks

The West Indian top shell (*Cittarium pica*) has been traditionally harvested from rocky surf-washed areas in Antigua and Barbuda. While the species has been heavily exploited at a subsistence level in these surf or splash zones, its extent and status is unknown.

Crabs

Marine crabs are not heavily exploited in Antigua and Barbuda. Most are a by-catch of the trap fishery. Species include the Batwing coral crab (*Carpilius corallinus*) and Channel clinging crab (*Mithrax spinosissimus*) (Figure 22). The latter species is of interest since it can serve as a substitute to the world famous "Alaska king crab". Landings of the Batwing coral crab is about 1.0 metric ton per annum and valued at EC$15,000.

Figure 22. Channel Clinging Crab (*Mithrax spinosissimus*)

The Blue land crab (*Cardisoma guanhumi*) is a local delicacy. Traditionally, individuals would go “crabbing” during the rainy season in mangrove areas. However in recent times, a semi-commercial fishery has emerged in Barbuda to satisfy traditional taste. This has raised some concerns since Land crabs are vulnerable to over-exploitation when they are spawning. Despite the name, Land crabs require the marine environment to disperse their young. The female deposit their eggs in the sea, where the larval stages develop. Peaks in sales of this species tend to coincide with annual food fairs. In 2001, it was estimated that 1.6 metric tons was harvested and the retail value was EC$26,000.

Marine Turtles

Three species of marine turtles are known to nest in Antigua and Barbuda: Hawksbill (*Eretmochelys imbricata*), Green turtle (*Chelonia mydas*), and the Leatherback (*Dermochelys coriacea*). Fewer than 130 females (combined) are estimated to nest annually (Eckert et al. 1992). The Loggerhead turtle (*Caretta caretta*) is seen occasionally in offshore areas.

Marine turtles are acknowledged to be endangered species by the World Conservation Union (IUCN). Species are highly vulnerable because most do not reach sexual maturity before 25 to 30 years.

Green and Hawksbill turtles are occasionally caught in gill nets. In most cases, the turtles are released. In the 1990s the number of turtles landed did not exceed 30 per year (Eckert et al. 1992). Leatherbacks are rarely caught.

In order to ensure proper management of this migratory, regional resource, the Fisheries Division is considering the adoption of various elements of the WIDECAST Sea Turtle Recovery Action Plan for Antigua and Barbuda (Eckert et al. 1992).

Profile of Fishers

Work Status and Sex

Table 6 summarises the work status of registered fishers by sex. Based on the distribution, full time fishers account for at least 46% of the registered fishers, with females representing only 2% of the total number of individuals. Females are employed mainly in secondary production activities (e.g., processing, marketing, vending and or retailing).

Table 6. Work Status of Registered Fishers in Antigua and Barbuda by Sex for 2004.

Work Status	Sex	Number of Fishers
Full Time	Male Female	489 13
Part Time	Male Female	318 4
Occasional	Male Female	60 0
Status Unspecified	Male Female	203 1
Total	Male Female	1070 18

Age Distribution

In general, the fisheries sector is comprised of a high proportion of middle aged to elderly persons. Figure 23 summaries the age distribution of two traditional fishing communities. The average age of fishers, in Grays-Green and Point-Villa was 45.6 and 48.0 years respectively. In both cases, fishers less than 36 years made up less than 25% of the population. This is possibly an indication that the sector is declining in importance in these areas. Ideally, managers would prefer sufficient entrants at the base of the “pyramid” to support future development of the sector.

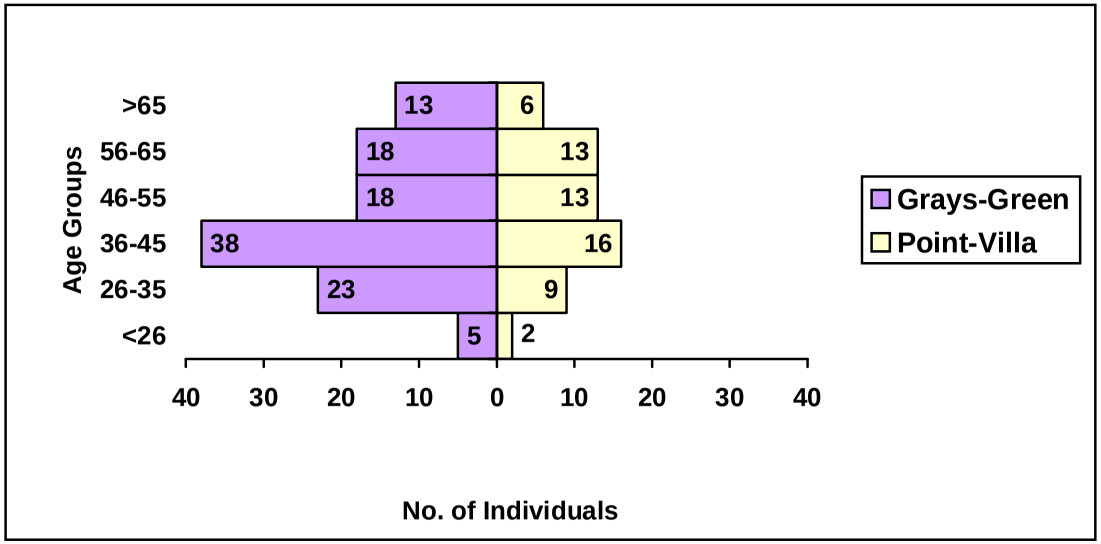


Figure 23. Age Distribution of Fishers Residing in the Communities of Grays-Green and Point-Villa (Horsford 2005).

Educational Background

In Antigua and Barbuda, 52% of individuals of working age are educated beyond the primary school level (based on the 1991 Census). A significantly smaller percentage of fishers are educated beyond this level. For example, only 29% of the fishers from Grays-Green are educated beyond primary school, while for Point-Villa the level was lower, 24% (Figure 24). Considering the average age of fishers (45.6 and 48.0 years), a contributing factor to the low level of educational attainment was access to secondary institutions (Horsford 2005). Prior to the mid-1960s, most secondary schools where privately owned. Hence, making it difficult for the children of the “common man” to further their education. Since 1973, education has been free and compulsory for children 5 to 16 years old.

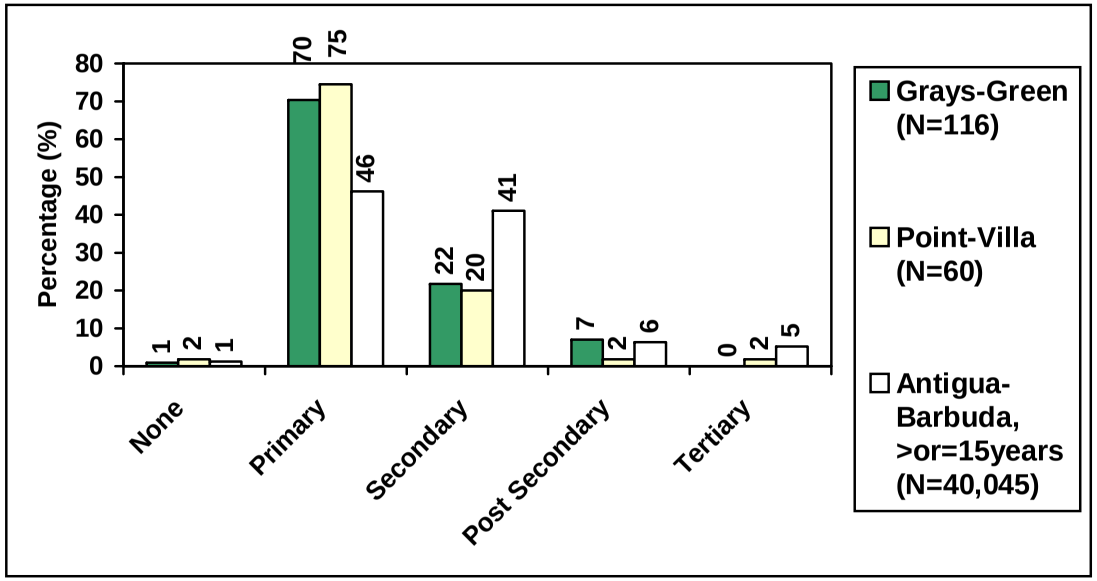


Figure 24. Level of Education Attained by Fishers (Horsford 2005).

Dependency on the Fisheries Sector

Table 7 summaries the level of dependency on the fisheries sector for various communities. Value range from as low as seven in every hundred persons in Point-Villa, are financially dependent on the fisheries sector, to as high as one in every four persons residing in Codrington, Barbuda (Horsford 2000 and 2005).

Table 7. Level of Dependency on the Fisheries Sector for Selected Communities (Horsford 2000 and 2005).

Community	Population	Fishers residing in the community	Average no. of dependants per fisher	Est. no. of dependants residing in the community	Est. % of the population directly dependent on fishing

Codrington (Barbuda)	1,200	71	3.3	235	26%
Round South (Antigua)	2,021	58	3.9	113	9%
Grays-Green (Antigua)	4,597	116	3.0	348	10%
Point-Villa (Antigua)	3,768	60	3.4	204	7%

Fisheries Infrastructure

Landing Sites

There are 32 fish landing sites in Antigua and Barbuda (Figures 25 and 26). Sites range from rural beaches (with limited or no infrastructure) to fisheries complexes (with potable water, ice-making and chill storage facilities). At present, only 4 of the 32 landing sites meet international standards (e.g. the European Union) for export of fishery products. The completion of the Point Wharf Fisheries Complex in December 2005 will bring the total number of sites in compliance with international standards up to five. The Fisheries Division hopes to use the facility as an export and inspection centre. The facility will include a small laboratory to conduct sensory evaluation of fishery products. A similar facility is earmarked for Barbuda.

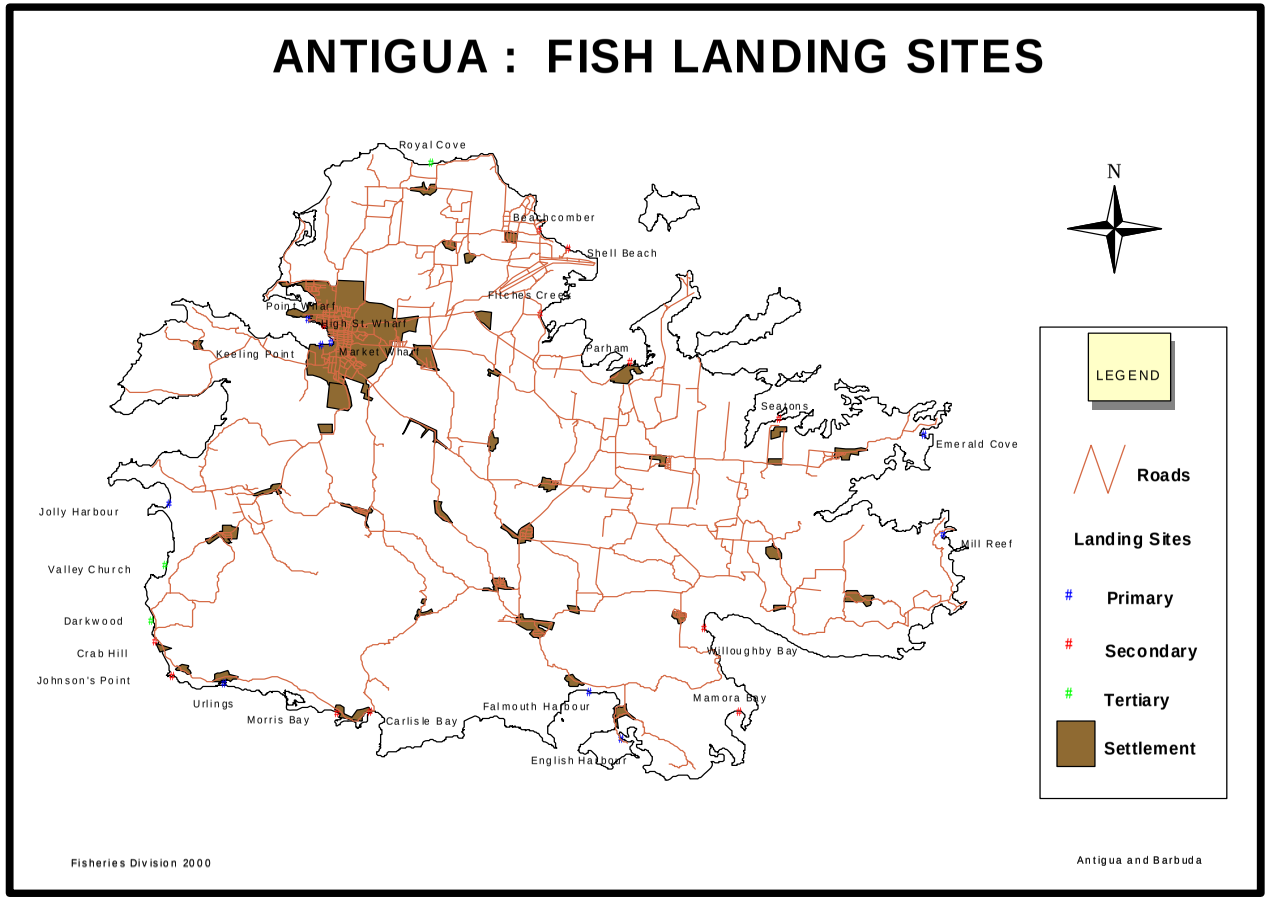


Figure 25. Fish Landing Sites in Antigua.

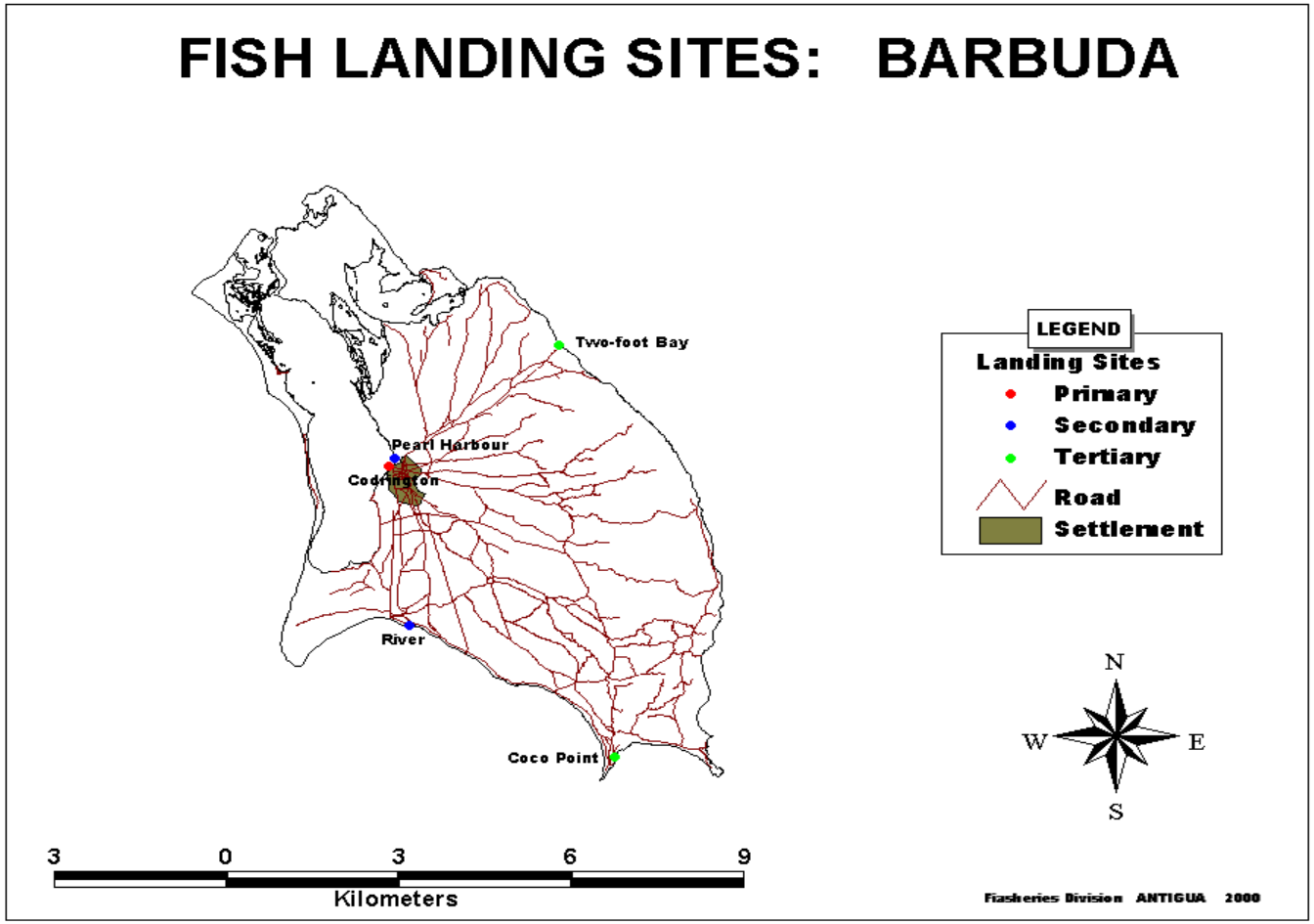


Figure 26. Fish Landing Sites in Barbuda.

Fishing Fleet and Methods

At end of 2004, there were 728 vessels registered at the Fisheries Division, however, only 276 were actively fishing (Figure 27). As stated previously, the numerous hurricanes experienced over the past decade has somewhat curtail the level of fishing activity.

Over the past thirty years, the fishing fleet of Antigua and Barbuda has undergone significant modernisation. Most of the wooden sloops and dories that dominated the sector in the early seventies have been gradually replaced by modern fibreglass launches and pirogues with the latest fishing equipment (global positioning systems, depth sounder, trap haulers, etc). While there have been significant changes in terms of vessel construction and fishing technology, traps or "fish pot" remain the dominant gear. In 2004, trap-fishing vessels comprised 51% of the active fleet, followed by hand line vessels (16%). The distribution by primary fishing method for the rest of the fleet was: gillnetting, 13%; trolling, 10%; SCUBA diving, 6%; free diving, 3%; and longlining, 1% (Figure 28).

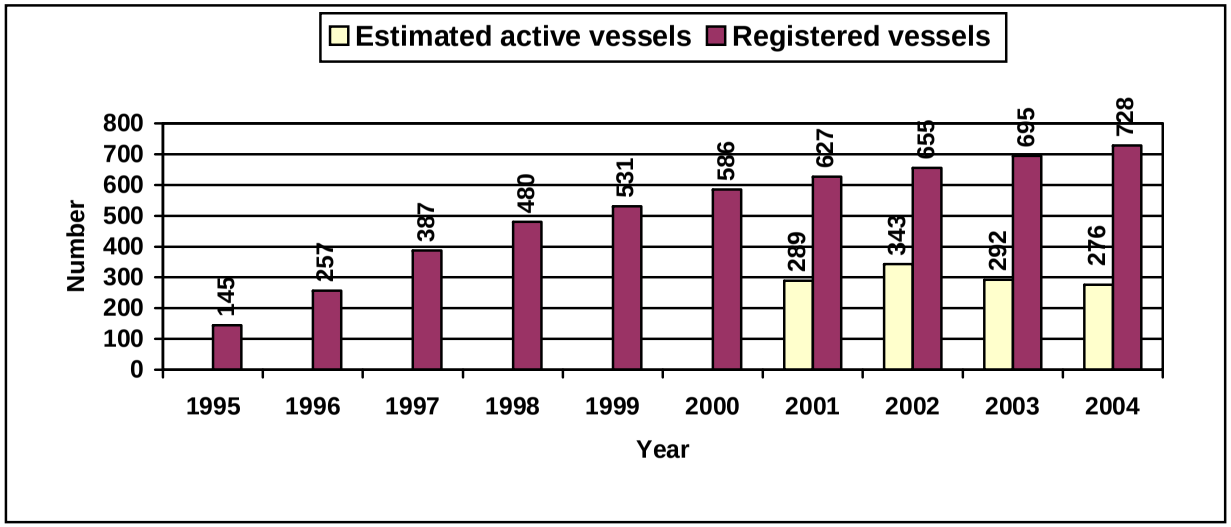


Figure 27. Number of registered and estimated active vessels at year-end in Antigua and Barbuda.

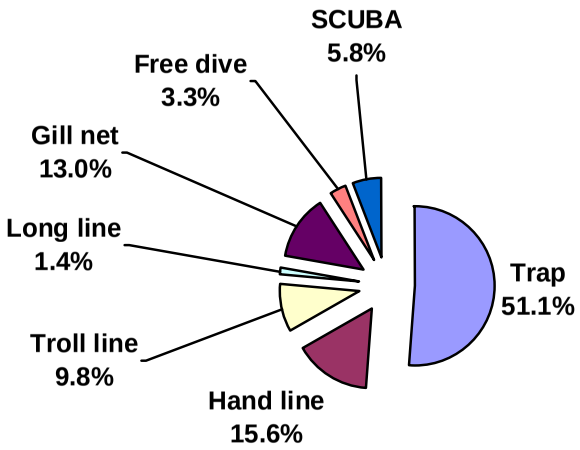


Figure 28. Composition of the active fishing fleet in Antigua and Barbuda by primary gear in 2004 (N = 276).

Technological Features of the Fleet

Figures 29 to 32 summarises the technological features of the fishing fleet in 2001. In general, vessels were predominately small (less than 30 feet), with the hull constructed in an open design of fibreglass-reinforced plastic and powered by two-stoke outboard engines, with mean power of 46 horsepower (Horsford 2004 c). The larger classes of vessels were mainly fibreglass launches powered by inboard diesel engines and ranged from 31 to 50 feet. Mean engine power was 268 horsepower (*ibid*).

The Fisheries Division is in the process of setting standards for fishing vessels with respect to vessel construction and sanitation. This has risen out of the need to meet food safety requirements with respect to trade as well as to ensure the safety of fishers.

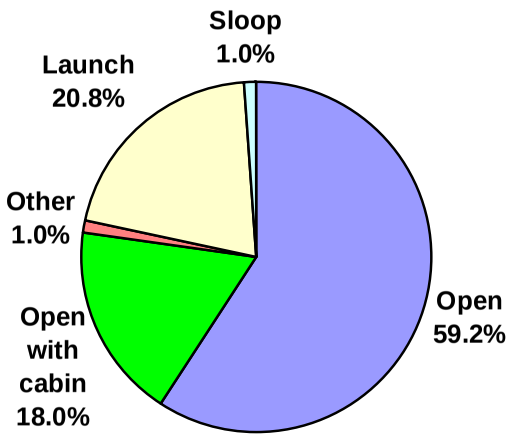


Figure 29. Composition of the active fishing fleet of Antigua and Barbuda in 2001 (N = 289).

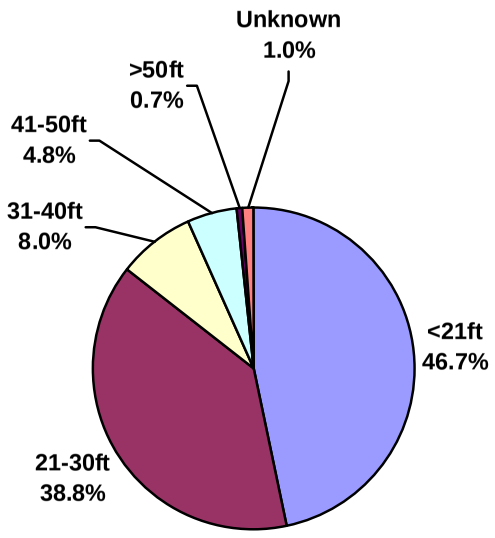


Figure 30. Size distribution of the active fishing fleet in Antigua and Barbuda in 2001 (N = 289).

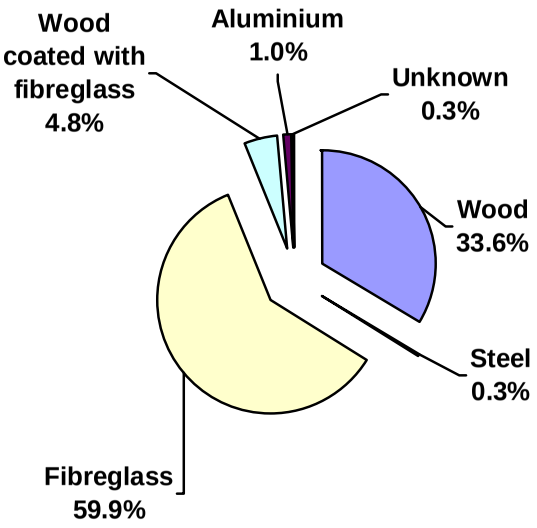


Figure 31. Composition of the active fishing fleet of Antigua and Barbuda by hull material in 2001 (N = 289).

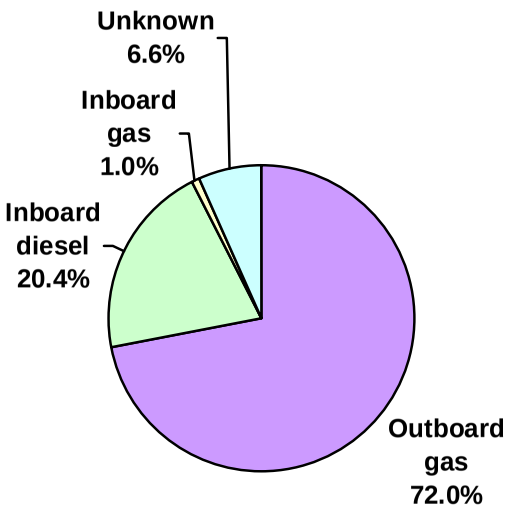


Figure 32. Composition of the active fishing fleet of Antigua and Barbuda by engine type in 2001 (N = 289).

Fishery Production

In 2004, capture production (of finfish, spiny lobster and queen conch) was 2,527 metric tons and valued at EC$30 Million. Over the past decade fisheries production has continued to rise, with most of the growth taking place due to increase landings of finfish (Figure 33). Much of this growth may be attributed to increase demands within the tourism sector, however accurate mid-year estimates of population and tourism statistics on fish consumption would be needed to confirm this.

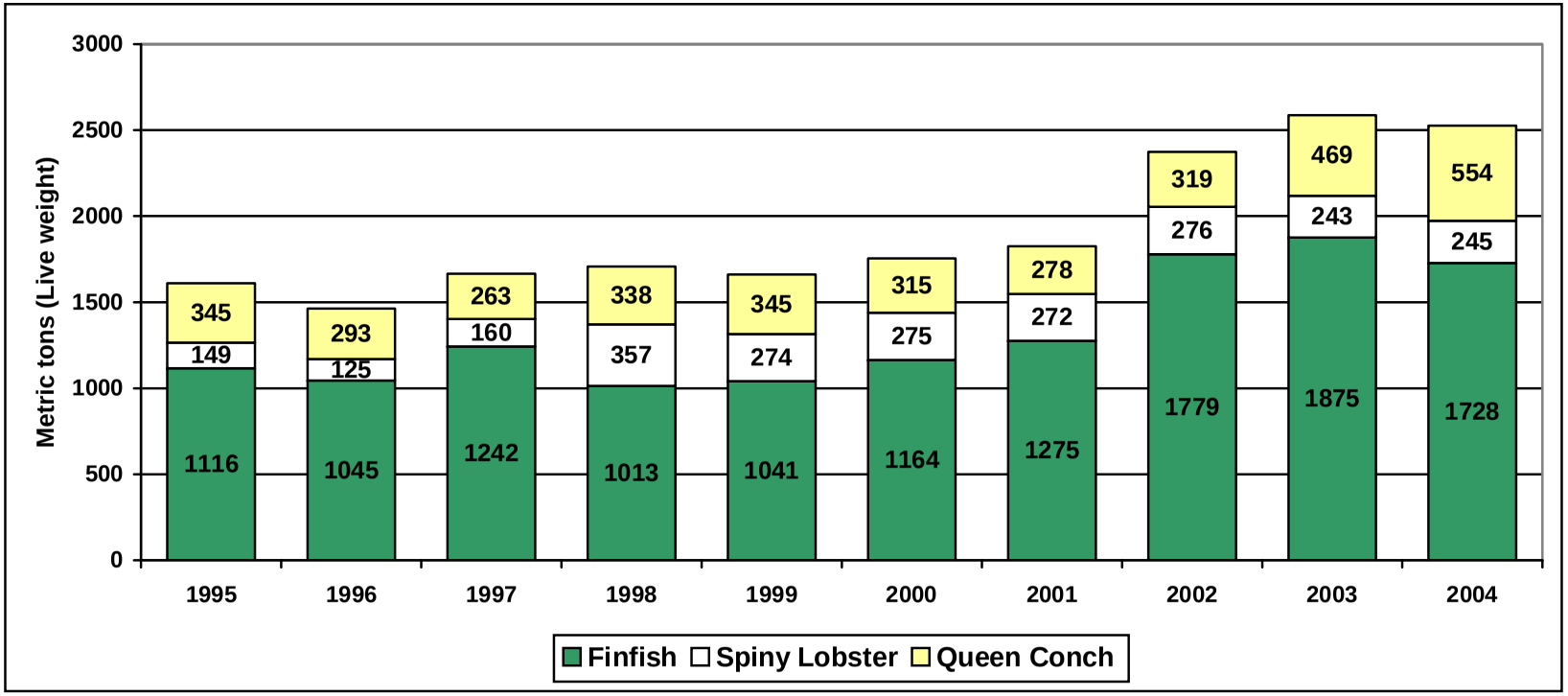


Figure 33. Trend in Capture Production for Antigua and Barbuda.

Fishery Exports

For decades, Antigua and Barbuda has supplied the French territories in the region with seafood. Today, the greatest challenge facing domestic exporters originates from external factors that govern trade. With the formation of the single European market in January 1993, legislation governing the production of food were harmonised throughout the European Community. One of the goals of the harmonised legislation is to satisfy the consumer demand for food safety and quality. In keeping with this, Directives 91/492/EEC and 91/493/EEC lay down the health conditions for fish and other seafood products to be imported into the European Community. The key principle behind these Directives is that seafood products intended for export to the European Community must be handled, processed and stored under conditions equivalent to those required for European products. This "equivalence principle" has been a major challenge for local authorities and domestic exporters alike. The stringent technical standards, the need for accompanying legislation and infrastructure make the process an arduous task for most developing countries.

These changes have drastically affected the export sector. In 1989, domestic export of seafood from Antigua and Barbuda was 214 metric tons and valued at EC$2.9 Million (based on constant 1990 prices). This has decreased to 83 metric tons or EC$1.5 Million, in 2004 (Figure 34). While domestic exports have shown marginal increases since 2000, exports have not recovered to the levels they were prior to the European Community harmonising their legislation. Since 1989 the contribution of fisheries production to domestic exports has decreased significantly from 25% (in 1989) to 3% (since 2000).

High retail value for seafood due to relatively high cost of production has limited the viability of alternative markets such as the USA and Canada; comparable prices can be obtained from the local tourism sector.

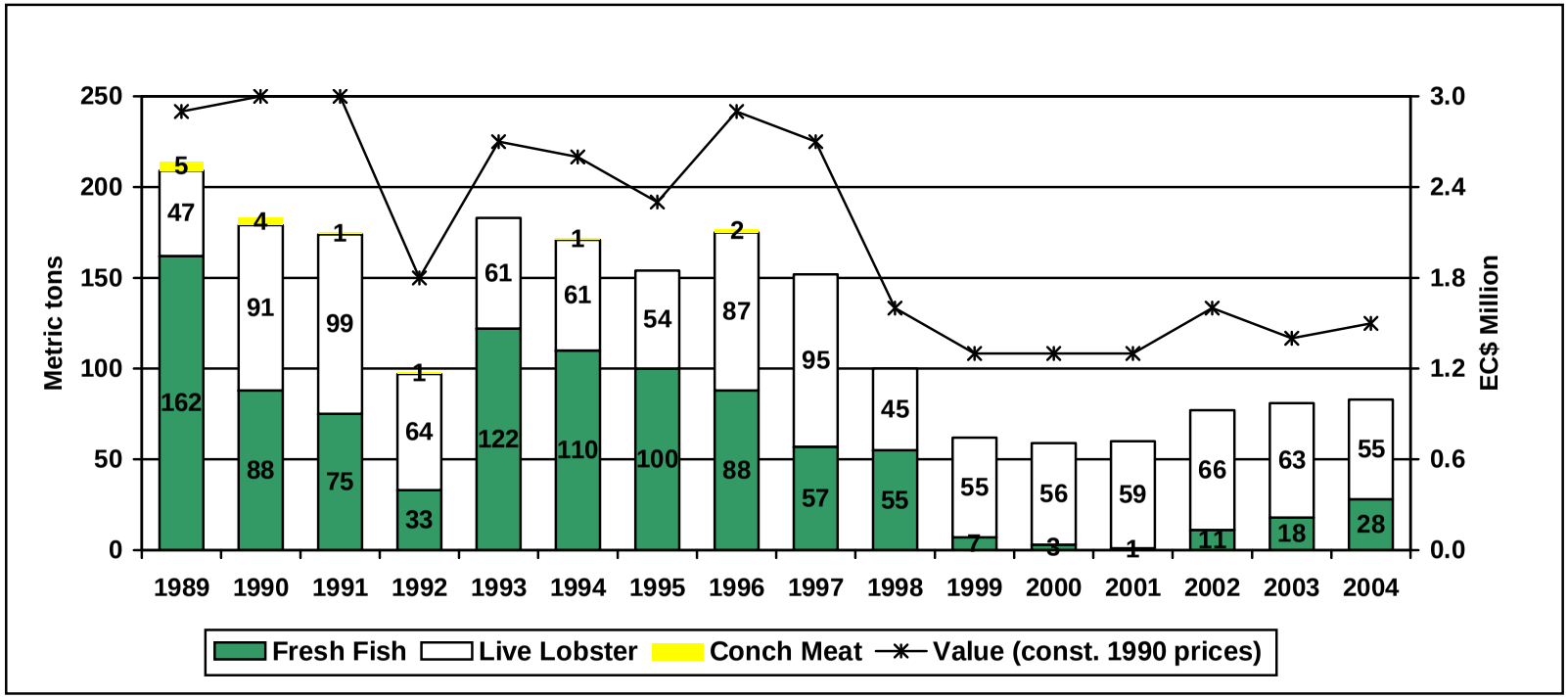


Figure 34. Domestic Export of Fishery Products from Antigua and Barbuda.

In recent time, live lobster has dominated domestic exports due in part to Article 5 of Directive 91/493/EEC, which forbids the placing on the market of fishery products containing ciguatera toxins – the toxins responsible for "fish poisoning". This legislation has restricted exports to mainly live lobster since exporters cannot guarantee that their products are free from such toxins. Fish poisoning has long been recognised as a serious health problem endemic to the Leeward and Virgin Islands, with Antigua and Barbuda having some of the highest number of reported cases in the sub-region (295 cases in 2001 and 276 cases in 2002) (Horsford 2004 d). With such figures, fish poisoning will continue to be detrimental to trade and a burden on our health care system.

Antigua and Barbuda presently has "provisional approval" from the European Commission to allow for export of fresh seafood (including live lobster). Grenada is the only other OECS country eligible to export to the European Community (Commission

Decision of 12 July 2005). Continual approval for Antigua and Barbuda however, depends on addressing the concerns raised by the Food and Veterinary Office of the European Commission, following an inspection in November 2002. Recommendations made by the inspectors included:

- update of the fisheries legislation to meet the European legal provisions;
- accreditation of the national laboratory;
- refurbishing of deficient landing sites;
- development of systems to monitor and test seafood for environmental contaminants including ciguatera toxins;
- assessment and implementation of HACCP (Hazard Analysis Critical Control Point) system in fish processing establishments. HACCP is a "preventative-based" food safety system.

In terms of progress made in addressing these issues:

- Fisheries Division in 2003 sought assistance from the Food and Agriculture Organization of the UN with respect to drafting legislation to bring the *Fisheries Act (1983)* and the *Fisheries Regulations (1990)*, in line with development in current international fisheries law (including the European legal provision) and related environmental agreements. Consultation on the draft legislation took place in May 2004. It awaits parliamentary approval.
- The inception of a monitoring programme for ciguatera started in August 2005 with the visit of a Cuban specialist as part of co-operation programme between Antigua – Barbuda and Cuba.
- With the completion of the Point Wharf Fisheries Complex in December 2005, Antigua and Barbuda will have five of its thirty-two landing sites in compliance with the European legislation. The Fisheries Division hopes to use the facility as an export and inspection centre. The facility will include a small laboratory to conduct sensory evaluation of fishery products. A similar facility is earmarked for Barbuda.
- Regarding the assessment and implementation of HACCP system, the Fisheries Division continues to provide technical assistance to fish processors.

In terms of vulnerability, the Barbudan economy is highly at risk due to its heavy reliance on lobster exports as a foreign exchange earner. As much as 84% of the lobsters landed are shipped to the French territories in the region (Horsford 2004 a). Trade sanctions resulting from failure to meet European standards can have dire implications. In 2004, retail value of lobster exports from Barbuda was EC$1.0 Million. This is approximately EC$10,000 for each fisher in Barbuda.

Fishery Imports and Balance of Trade

Figure 35 summarises the balance of trade in terms of value for fish and fishery products. Antigua and Barbuda is a net importer, however domestic exports of high-valued products such as lobster is narrowing the trade deficit. While the goal of the government is for self-sufficiency, import levels are expected to remain high until local processors can satisfy traditional taste for cured products (e.g., salted cod, smoked herring and mackerel). These products make up the bulk of the imports (Figure 36). The proposed development of salted products (e.g., shark) and the development of a small-scale pelagic fishery may address some of the demands for cured and canned products (e.g., tuna).

The dependence on an international agency for statistics on imports highlights the need for the development of the local Statistics Division. Without the availability of “timely” and “accurate” statistics the Fisheries Division is limited in its ability to plan ahead. The computerisation of Customs and Excise should aid the process.

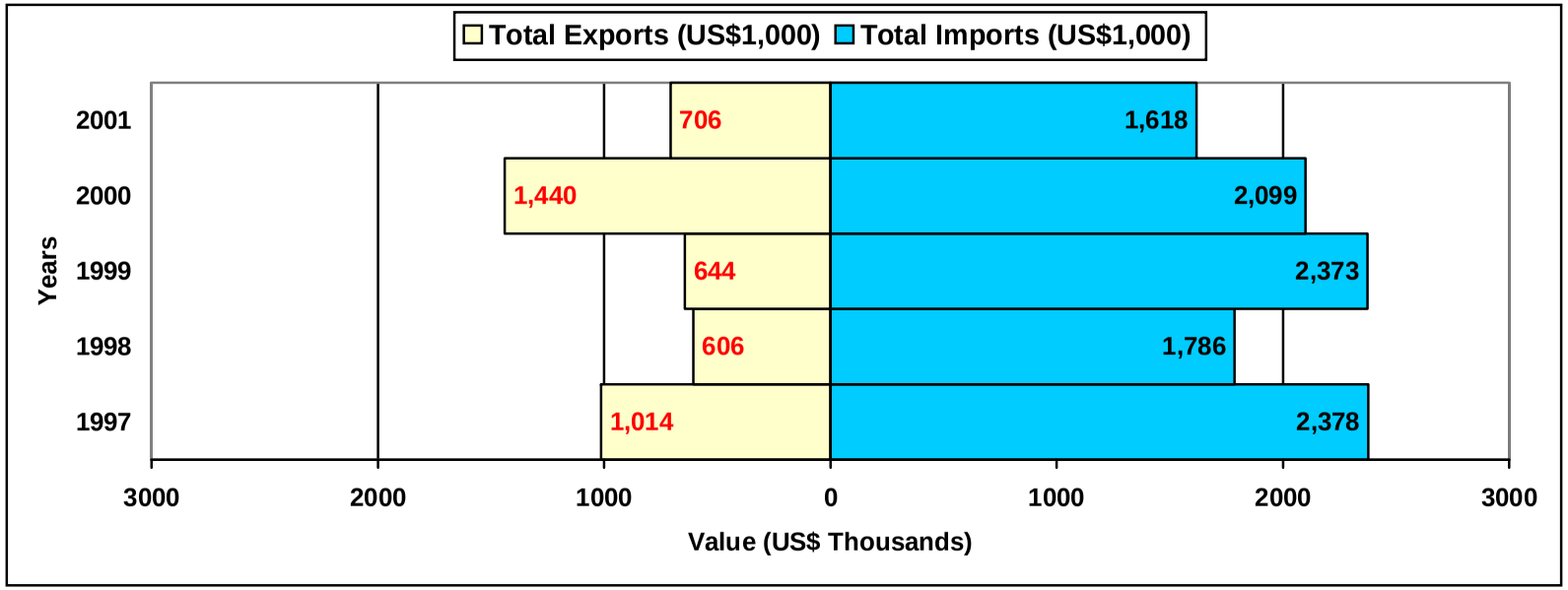


Figure 35. **Balance of Trade for Fish and Fishery Products for Antigua and Barbuda (Source: FAOSTAT Data 2005). Valuation of imports is based on c.i.f. value. Valuation of exports is based on f.o.b. value. Total imports consist of all imports into country including goods into bonded warehouses or free zones. Total exports consist of the combination of domestic exports and re-exports.**

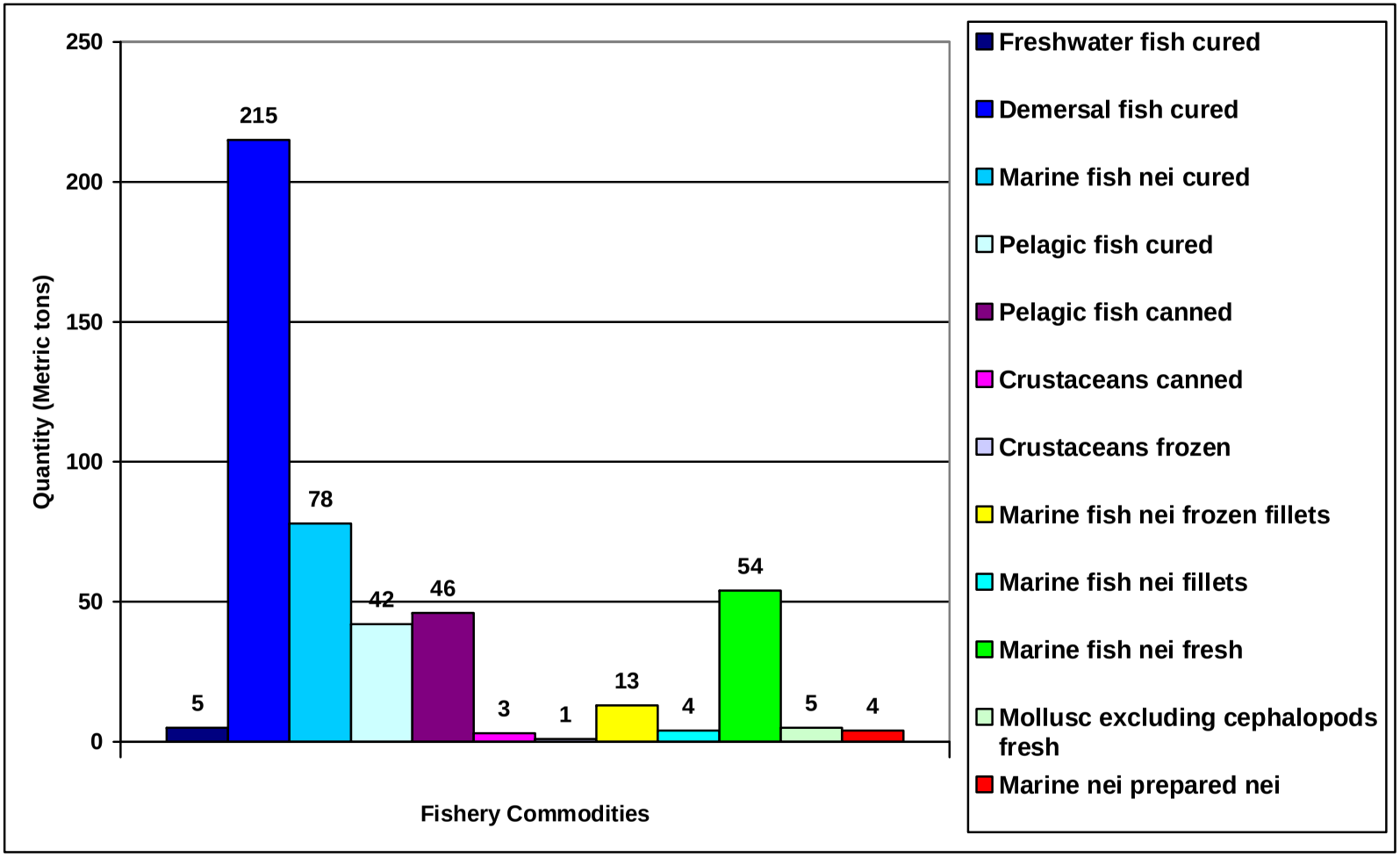


Figure 36. **Fish and Fishery Products Imported into Antigua and Barbuda in 2000 (Source: FAOSTAT Data 2005). Note: nei = "not elsewhere included".**

Apparent Consumption

In the absence of current trade statistics with respect to imports of fish and fishery products, an estimate of the apparent consumption was made using trade data from FAOSTAT – one of the databases of the Food and Agriculture Organisation of the UN (Table 8).

An apparent consumption of 47.8 kg per caput per year was obtained. This is about 8.7 lbs per individual per month. While the level of consumption appears high it has to be viewed within the context of the demands of the tourism sector (i.e., the value is unadjusted for tourism consumption). Another factor that affects the level of consumption is the impact of certain species. For example, the conversion of meat weight for the Queen conch to live weight significantly changes its contribution to production since most of the weight comes from the shell.

Table 8. Apparent Seafood Consumption for Antigua and Barbuda in 2002.

Production (MT Live Weight)	Total Import[1] (MT Live Weight)	Total Export[2] (MT Live Weight)	Food Supply (MT Live Weight)	Population[3]	Per Caput Supply (kg live weight/year)
2,374	1,908	465	3,817	79,912	47.8

1 Source: FAOSTAT Data 2005
2 Source: FAOSTAT Data 2005
3 Source: Statistics Division, Government of Antigua and Barbuda

Aquaculture / Mariculture

Some attempts have been made at mariculture but none has been successful. Past projects include the culture of Catfish and Tilapia, King Crab (sponsored by the Smithsonian Institute), Seaweed (sponsored by the Canadian IDRC project in Barbuda) and Antigua Shrimp Culture (sponsored by the Eastern Caribbean Mariculture Ltd.).

The most ambitious of these projects was the Antigua Shrimp culture. Trial operation began in 1982 and obtained funds from the U.S. Agency for International Development (U. S. AID), the Bank of Antigua and the Caribbean Food Cooperation. The farm was located

at Nonsuch Bay and had a quarantine/nursery laboratory and 6 x 2 hectare grow-out ponds, supported by a 10 hectares reservoir. Commercial operations started in 1995 using *Penaeus vannamei*, but also experimented with *P. monodon*. The production was sold primarily in the local market. Low yields, 0.36 - 0.57 metric tons per hectare were recorded. The company reported difficulty in obtaining disease-free juveniles. The original project was conceived as a pilot project for the Lesser Antilles, but encountered difficulties and the Eastern Caribbean Group of Companies, a St. Vincent food-processing group, purchased majority ownership and renamed the company Eastern Caribbean. At the time of operation it was one of two existing companies in the Eastern Caribbean; the other located in St. Kitts.

The Fisheries Division lacks a professional aquaculturist or mariculturist. In 2005, Fisheries Assistant, Mr. Hilroy Simon, received some train in this area courtesy the Peoples Republic of China. Ensuring that the Division has an aquaculturist or mariculturist on staff is the first step in developing this sector.

In terms of legislative framework for aquaculture or mariculture, the draft fisheries legislation provides a framework for development. This is important since inadequate management of aquaculture and mariculture facilities can have a negative impact on the environment.

Impact of Natural Disasters

Over the past decade, the Caribbean has seen storms of increasing frequency and ferocity. The fisheries sector has suffered major setbacks because most of the infrastructure is located in coastal areas. For example, Antigua and Barbuda has suffered significant hurricane damage in recent times. Cumulative value for the loss of gear (mainly traps) due to Hurricane Luis (1995), Georges (1998), Jose (1999) and Lenny (1999) was EC$4.90 Million (Table 9). Estimated value for the damage done to the fisheries sector (vessels, gears and infrastructure) by Hurricane Luis and Georges was EC$4.24 Million and EC$3.35 Million, respectively. Relief assistance to the sector came from the Food and Agriculture Organization and the Red Cross, in the form of mesh wire to replace fishing gear. The extensive damage done by these storms to marine habitats (mangroves, sea-grass beds, coral reefs) has yet to be quantified. While fishers have taken certain steps to mitigate the impact of storms (e.g., reducing the number of traps set during the hurricane season), the sector remains highly vulnerable. This is due to the fact that most fishers have limited access to insurance as a result of the high cost of coverage or the unavailability of coverage for certain types of fishing vessels (e.g., wooden dories). With this in mind it might be prudent to revisit the issue of an “OECS insurance scheme” for the fisheries sector, particularly since the availability of disaster aid is becoming scarce. Such a fund does not have to be limited to insurance; it can be broaden to address issues such as “poverty with respect to retired fishers” through the development of a retirement plan.

Table 9. Summary of Fishing Gear (Traps) Losses due to Hurricanes from 1995 to 1999 (Horsford 2000).

Hurricane	Number of traps lost	Value (EC$)	% loss of the total # of traps in operation
Luis (Sept. 1995)	12,064	EC$1,714,631	60.3
Georges (Oct. 1998)	11,017	EC$1,765,530	55.0
Jose (Oct. 1999)	6,313	EC$1,322,661	31.6
Lenny (Nov. 1999)	492	EC$96,550	2.5
Total	**29,886**	**EC$4,899,372**	

Institutional Support to the Fisheries Sector

Fisheries Administration

The Ministry of Agriculture, Lands, Marine Resources and Agro-industry has overall responsibility for the fisheries sub-sector. Fisheries have been accorded "divisional status" within the Ministry, with the Chief Fisheries Officer reporting directly to the Permanent Secretary. The 2005 staff complement of the Fisheries Division is as follows:

Technical

- Chief Fisheries Officer, Cheryl Jeffrey-Appleton, B.A., Diploma (Environmental & Resource Management), Masters in Marine Management;
- Senior Fisheries Officer, Philmore James, B.Sc., professional experience in park management, GIS trained;
- Fisheries Officer, Ian Horsford, B.Sc. (Marine Biology & Mathematical Sc.), Diploma (Pure & Applied Sc.), HACCP trained;
- Fisheries Officer, Tricia Lovell, B.Sc. (Marine Biology), Masters in Marine Management;
- Fisheries Assistant, George Looby, extensive training in gear technology;
- Fisheries Assistant, Mark Archibald, Dive Master;
- Fisheries Assistant, Hilroy Simon, training in fisheries management and aquaculture;
- Fisheries Assistant, St. Clair Simon, training in extension;
- Fisheries Assistant, Verlyn George, training in food safety and quality assurance; HACCP trained

- Fisheries Assistant, Sherwin McIntosh experience in enforcement (ABDF Coast Guard);
- Fisheries Cadet, Jose Nelson
- Fisheries Cadet, Nikisha Frederick, CXC subjects; and
- Fisheries Cadet, Laurie Smith, CXC subjects.

Support:

- Executive Officer
- 2 Junior Clerks
- 1 Petty Officer
- 1 Messenger
- 1 Cleaner

In addition to the above-mentioned, the Urlings and Parham Fisheries Complexes fall under the control of the Chief Fisheries Officer. These complexes provide the following services to fishers: dry dock and berthing facilities; ice and chill storage; lockers and engineering workshop.

The staff complement for the Urlings Fisheries Complex includes:

- 1 Manager
- 1 Clerk
- 1 Cleaner
- 1 Grounds man

While the staff complement for Parham includes:

- 1 Manager
- 2 Clerks
- 1 Cleaner
- 1 Grounds man

The Point Wharf Fisheries Complex is schedule to be completed in December 2005. The proposed management structure is outlined in the Fisheries Development Plan.

The Fisheries Division has two four-wheeled drive vehicles and one 20-foot vessel.

In 2005, the estimated recurrent expenditure of the Fisheries Division was EC$997,756. In 2004, the approved recurrent expenditure was EC$748,044.

Fisheries Credit and Loan Facilities and other Incentives

The main agencies that provide loans to the fisheries sector are the National Development Foundation (NDF) and the Antigua and Barbuda Development Bank (ABDB). In 1995, NDF disbursed EC$0.28 Million in loans to fishers, approximately 12% of its total loan portfolio (EC$2.37 Million). From July 1, 1974 – December 31, 1998, ABDB disbursed EC$5.16 Million, 5.9% of the cumulative loan portfolio (EC$87.89 Million). ABDB does not have a ceiling on loans but EC$300,000 is used as a rough cut-off point. The same applies to NDF; each loan application is evaluated before determining a ceiling. Both banks normally require a business plan showing expenditures and earnings for loans concerned with the purchase of a vessel. Vessels used as collateral to guarantee loans must be insured. Hence fishers usually insure their vessels only for the amortization period of the loan. Most fishers find the premiums and surveyor's fees exorbitant (a marine surveyor charges approximately EC$400 per hour). In general, only the large fibreglass launches tend to be insured and coverage is limited to total loss. In Barbuda, a few of the open boats used to transport tourist on tours are insured.

The current rate of interest offered by the development banks is between 10 – 13% on a reducing balance for a maximum of 10 years. On average, the term for most loans offered is 4 – 5 years. The banks accept cash, land, property, life insurance and to a less extent a bill of sale on vessel and engine, as collateral. First time borrowers require a letter of recommendation from the Chief Fisheries Officer (in the case of ABDB).

Commercial banks also offer loans to fishers. On average the current rate of interest range from 7.5 – 8.5% on the fixed amount for 5 years. Recently some fishers have turn away from the original institutions that were set up to assist micro-enterprises (NDF and ABDB) and turn to the commercial banks. They complain that they don't see the benefits of dealing with these institutions as oppose to the commercial banks (despite the greater flexibility offered with respect to repayment). In 2000, ABDB had to suspend all new loans to the fisheries sector due to the high level of delinquent debts. This may well be the reason for the shift in loan applications to the commercial banks.

In general, most loans offered by development banks range between EC$30-50,000 and are primarily for the purchase of a small vessel and engine. Areas such as aquaculture represent "uncharted territory" for most lending institutions. Their limited ability to technically evaluate the feasibility of these kinds of projects, create a certain level of uncertainty. The Fisheries Division could play a greater role in "facilitating" access to credit if it had the necessary technical capability (e.g., fisheries economist or aquaculturist) to evaluate the feasibility of such projects. With a fisheries economist on staff the Division could further development the Extension Programme. Training fishers with respect to "money management" is needed. All too often fishers do not keep proper records of their sales and expenditure. Hence their ability to assess their fishing operations or to access credit is fairly limited.

Table 10. Summary of the Investment Cost (in EC$) of Individual Trap-fishing Units in 2000 ("w" = wood and "f" = fiberglass) (Horsford 2001 b).

Investment	**Hull**	**Engine**	**Fishing equipment and other**	**Traps plus buoy and rope**	**Total**
Depreciation Rate (%)	15	30 (OB) (1) 10 (IB) (2)	10	– (3)	
Type of Fleet					
Open (w/f)					
Antigua	15,400	9,902(OB)	1,471	7,825	34,598
Barbuda	19,040	9,202(OB)	690	11,084	40,016
Overall	16,856	9,622(OB)	1,159	9,129	36,765
Cabin (w/f)	23,000	14,268(OB)	5,320	10,179	52,767
Sloop (w)	66,000	26,000 (IB)	12,847	12,907	117,754
Launch (w)	74,600	37,800 (IB)	10,514	41,787	164,701
Launch (f)	101,250	54,125 (IB)	12,335	29,085	196,794

(1) Outboard Engine
(2) Inboard Engine
(3) Depreciation rate not applied to traps since their lifespan is approximately 9 - 12 months (Jeffrey, 1990). Straight-line depreciation method used in all cases.

Concessions, Incentives and Subsidies

Bona-fide fishers are entitled to tax and duty-free concessions for fishing vessels, marine engines, fishing gear and other related fishing equipment. On verification by the Chief Fisheries Office and approval of the Financial Secretary and Cabinet, the duty and consumption tax are waived by the Comptroller of Customs. For a typical outboard engine, import duty (at 5% of the cost, insurance and freight value – c.i.f.) and consumption tax (at 20% of the c.i.f.) are waived. Fishing vessels are exempt from duty and the 30% consumption tax is also waived. Fishers are only required to pay the customs service tax at a rate of 10% of the c.i.f. value. It should be noted that tax exemptions are not limited to bona-fide fishers; retailers who purchase fishing inputs also qualify. Ice is sold at subsidized rate to bona-fide fishers at the various fisheries complexes. There is no rebate on fuel.

In April 2000, the Cabinet of Antigua and Barbuda agreed that persons applying for duty free concessions on motor vehicles for fishing-related activities should be granted 50% only of the duty and consumption tax, while the full customs service tax must always be paid. The rate of duty on motor vehicles is 35% and the consumption tax range from 30 – 50% of the c.i.f. value.

Fisher-folk Organisations

In general, attempts to develop and strengthen fisher-folk organisations in Antigua and Barbuda have had minimal success. This is due in part to the "independent nature" of fishers but also influenced by the general feeling of mistrust created by issues such piracy and user conflict. Now more than ever fisher-folk organisations need to be strong to face the challenges of globalisation. For only as a unified group will they be able to take advantage of some of the benefits of globalisation (e.g., greater access to development aid) and influence polices that affect their livelihood (whether it may be national or regional).

Currently there are three fisher-folk organisations functioning:

- St. John's Fishermen Co-operative Society Ltd
- Antigua and Barbuda Fishermen's Alliance; and
- South Coast Fishermen Co-operative Society Ltd.

The St. John's Fishermen Co-operative was established in 1994. The principal aim of the co-operative is to improve the economic welfare of its members through utilising their united funds and efforts for the better harvesting, processing and marketing of fish and fish product. It currently has about 80 registered members.

The Antigua and Barbuda Fishermen's Alliance was formed in January 1997 as a result of a rift caused by the St. John's Fishermen Co-operative executives with respect to the issue of incursion of foreign (Guadeloupian) fishers into Antigua and Barbuda's waters. The alliance was formed particularly to ensure adequate representation of all local fishermen. One of the main objectives was to represent its members at a national level on all matters pertaining to the fishing industry.

South Coast Fishermen Co-operative Society Ltd. was recently formed in June 2005. It has about 60 active financial members. The main goal of the organisation is to unite for their own economic benefit through the sustainable utilisation of the marine resources.

The Antigua and Barbuda Fishermen Association was formed in 1982 and the Barbuda Fishermen Co-operative Society Ltd. was formed in April 1997. Both are no longer functioning.

In recent times there has been resurgence in the development of co-operatives. This new interest is due in part to the revitalisation of the sector as a result of the new fisheries complexes. Presently the St. John's Fishermen Co-operative and the South Coast Fishermen Co-operative are two of the most active fisher-folk organisation. Attempts are been made to revitalise the co-operative in Barbuda.

For obvious reasons fishers need to be organised for their own benefit however the stimulus for organising should not be a specific issue since this may not promote longevity.

Fisheries Legislation

General

The *Fisheries Act, No.14 of 1983* and the *Fisheries Regulations, No.10 of 1990*, are the primary legislative basis for fisheries management and development. The Act applies to: an Exclusive Economic Zone (EEZ) and a fisheries zone (of 200 nautical miles); a territorial sea (of 12 nautical miles); archipelagic waters and internal waters as defined in the *Territorial Waters Act (1982)*; as well as any other waters over which Antigua and Barbuda claims fisheries jurisdiction. As noted previously, the full extent of the EEZ is unknown since negotiations with neighbouring states have yet to be completed.

The Act and Regulations make provision for: the establishment of a fisheries advisory committee; fisheries access agreements; fishing licensing (local and foreign); fisheries research; fish processing establishments; fisheries enforcement; and the registration of fishing vessels. Also conservation measures such as: prohibiting the use of any explosive, poison or other noxious substance for the purpose

of killing, stunning, disabling, or catching fish; close seasons; gear restrictions; and the creation of marine reserves. Under the Act, the Minister responsible for fisheries has the authority to create new regulations for management and conservation as and when necessary

Other Fisheries-related Legislation

Other fisheries-related legislation includes:

- the *Barbuda Local Government Act (1976)* – which gives the Barbuda Council (local governing body of no less than nine elected and two *ex officio* members) authority over its fisheries including the right to retain taxes on exported seafood;
- the *National Parks Act (1984)* – for the designation of any land area or water as a national park;
- the *Marine Areas (Preservation and Enhancement) Act (1972)* – for the declaration of marine protected areas; and
- the *Beach Control Ordinance (1991)* – for the control of sand mining.

New Draft Fisheries Legislation

In order for Antigua and Barbuda to meet the challenges posed by globalisation, trade liberalisation, multilateral environment agreements and international fisheries instruments, the Fisheries Division sought assistance from the Food and Agriculture Organization of the UN, in 2003, with respect to bring the *Fisheries Act (1983)* and the *Fisheries Regulations (1990)*, in line with development in current international fisheries law and related environmental agreements. Consultation with all relevant government authorities and stakeholders on the draft legislation took place in May 2004. It awaits parliamentary approval.

Issues reviewed (but not limited to) include:

- The guiding principles for fisheries management (e.g., sustainable development, responsible fisheries, the precautionary approach, the ecosystem approach)
- Registration, inspection and safety of fishing vessels (also the issue of vessel hygiene)
- Sport fishing (whether or not separate licensing scheme and regulations required)
- Prohibited conduct in fisheries (e.g., stealing of “fish pots”)
- Aquaculture (at present there is no legal framework)
- Record of authorisations, permits and licences (the introduction of provisions on the keeping and the use of information kept in such records)
- Seafood quality/safety and requirements for fish processing establishment (the need to implement food safety systems like Hazard Analysis and Critical Control Points)

- Food security (the Public Health Security and Bioterrorism Preparedness and Response Act of 2002, requires foreign food facilities that manufacture, process or hold food for human or animal consumption in the U.S. to register with the Food and Drug Administration)
- Artificial reefs and the use of fish aggregating devices (at present there is no legal framework)
- Conservation of turtles (possibly the introduction of maximum size regulations rather than minimum size or a "moratorium")
- Mandatory registration of local fishers (presently registration is voluntary)
- Regulation of by-catch (such as the landing of undersize fish)
- Marine reserves and restricted areas/protection of coral reefs (legal framework for management of such areas required)
- High seas fishing (not currently regulated in fisheries legislation)

Illegal, Unreported and Unregulated (IUU) Fishing

Local IUU Fishing

Tables 11 and 12 summarise the level of IUU fishing taking place locally in Antigua and Barbuda. With respect to licensing of fishing vessels between 42% and 58% of the active fishing vessels are not licensed. Estimated loss revenue as a result of not licensing is between EC$12,000 and EC$20,000 per annum. The situation regarding licensing in Barbuda is most dire; in 2004 the non-compliance rate was 79%.

In 2000 the number of traps lost to piracy was valued at EC$1.13 Million (Table 12). This value alone is greater than the Fisheries Division actual recurrent expenditure in 2001 (EC$492,990).

Table 11. Level of Non-compliance with respect to Licensing of Fishing Vessels in Antigua and Barbuda.

	Year			
	2001	**2002**	**2003**	**2004**
Number of fishing vessels licensed at year end	167	167	158	117
Estimated number of active fishing vessels (based on annual census)	289	343	292	276
Estimated rate of non-compliance with respect to	**42.2%**	**51.3%**	**45.8%**	**57.6%**

licensing				
Forecasted revenue estimated from licensing of active fishing vessels (including communication tax where applicable)	EC$35,460	EC$45,028	EC$39,375	EC$37,083
License and communication tax collected (EC$5 per foot plus EC$25 where applicable)	EC$23,840	EC$24,920	EC$23,319	EC$17,128
Estimated loss revenue due to non-compliance	**EC$11,620**	**EC$20,108**	**EC$16,056**	**EC$19,955**

Table 12. Summary of Trap Losses due to Piracy, Cut-away and Ground Swell in Antigua and Barbuda in 2000. Annual losses are based on the size of the trap-fishing fleet and the mean value of traps (Horsford 2001 b).

Type of Vessel	Total # of traps	% of total lost to piracy	% of total lost to cut-away	% of total lost to ground swell	Mean value of trap EC$	Annual Losses EC$		
						Piracy	Cut-away	Ground Swell
Antigua								
open/ cabin	47	28.4%	9.3%	4.8%	EC$148	EC$476,096	EC$155,905	EC$80,467
sloop/ launch	128	44.4%	5.4%	0%	EC$169	EC$547,463	EC$66,583	0
Total						EC$1,023,559	EC$222,488	EC$80,467
Barbuda								
open	56	29.8%	3.6%	40.3%	EC$153	EC$109,790	EC$13,263	EC$148,475
Overall						**EC$1,133,349**	**EC$235,571**	**EC$228,942**

Foreign IUU Fishing

While there have been no studies on foreign IUU fishing, the level is considered substantial based on anecdotal information from fishers and foreign fisheries patrols.

Between 1992 and 2004, the average weight of fish seized from foreign vessels was 205.6 kilograms. This currently retails at about EC$3,170 (based on EC$7 per lb). Using this value as an estimate of the mean catch and an conservative estimate of ten vessels fishing in our waters twice a week for 40 weeks, an estimate of the annual value of the illegal catch is EC$2.5 Million.

From 1992 to 2004, 80% of the individuals charged with fishing without a foreign license were from the neighbouring French territories (mainly Guadeloupe).

In order to arrest the current situation, greater resources will have to be allocated to the Fisheries Division and Antigua and Barbuda Defence Force Coast Guard, to increase there presence on the sea.

GOVERNMENT POLICY, OBJECTIVES AND STRATEGIES

The goal of the Fisheries Sector is to ensure its development occurs in a manner, which is *"sustainable"* and capable of contributing its full potential to the overall development of the national economy.

Objectives:

1. Improve the Fisheries Division management capabilities by:
   - Staffing the Fisheries Division with no less than trained professional and paraprofessional staff.
   - Increasing the budgetary financing to the sector and other agencies involved in fisheries enforcement.

2. To strengthen the capability of the Fisheries Division to integrate the sub-sector concerns in the wider framework of Coastal Zone Management and Development Planning. This entails the following broad strategic elements:
   - Consolidation of the information based on fisheries and on other sectors' impacts on them.
   - Awareness creation of the socio-economic contribution of the fisheries sector and of its role as a natural unit of the environment.
   - Strengthening of organisations and representation among the fishers, fishing communities and other related occupations.
   - Promotion of the supportive role of the Fisheries Division in Coastal Zone Management.

3. To increase the role the fishing industry plays in the building of the national economy, by:
   - Increasing local fish production of under-exploited species and raise per capita consumption.
   - Enhancement of the socio-economic status of fishers.
   - Encourage optimal exploitation of marine resource.
   - Maximize employment opportunities in the fisheries sector.
   - Modernising the fishing industry by the introduction of new technology.

4. To develop products to reduce importation of products

5. To increase incomes and returns to fishers and other members of the fishing community.
6. To increase investments, profits and jobs opportunities throughout all sectors of fishing industry.

7. To increase output and therefore fish protein supplies.

8. To improve marketing infrastructure to enhance product quality and increase value.

9. To upgrade fishing capabilities and strengthen fishing operations of the existing small scale fishermen.

10. To lay the groundwork for fisheries infrastructure related to fishing, distribution and marketing of fish.

11. To upgrade training and extension programmes in order to improve the status and career orientation of all participants in the sector and to increase public awareness of fisheries potential.

In pursuance of these objectives, present and planned programmes for fisheries management and development will be based on the implementation of the following policies and policy instruments.

Policies and Policy Instruments:

1. To enact and enforce, as necessary, appropriate and timely legislation and regulations for the management and conservation of the marine resources.

2. To actively participate and collaborate as necessary, at national, regional and international level with appropriate institutions, organisations and governments with a view to achieving harmonization and coordination of fishery regimes, regulations and access agreements within the Lesser Antilles region.

3. To encourage and support all sectors of the local fishing industry in the development of the pelagic fishery consistent with the application of appropriate resource management practices, bearing in mind that these resources are shared with other countries in the region.

4. To strengthen the Fisheries Division of the Ministry of Agriculture, Lands, Marine Resources and Agro Industry to enable it to provide improved services, assistance and advice to the fishing industry.

5. To assist and support the development of fisher-folk organisations in Antigua and Barbuda.

7. To encourage the further development of appropriate commercial-scale aquaculture/mariculture operations which will be beneficial to the country and consistent with the conservation of the environment.

Foreign Exchange: Fisheries contribute directly to foreign exchange generation through the export of fisheries products. It also contributes to substituting for other protein sources, which need to be imported. It also attracts foreign exchange though its tourism base fishing charters.

Employment: The fisheries sub-sector provides a wide range of employment opportunities for fish harvesters, processors, traders, wattle cutters, trap builders, transporters, boat builders, credit providers and ice-suppliers. The employment may be part-time and may be vital compliment to the other activities such as framing. It provides seasonal employment when other sectors are less busy. It has acted as a safety net during natural disasters, such as hurricanes and drought.

Poverty alleviation: Many people working in the other sectors turn to fishing seasonally or temporarily when faced with periodic cycles of unemployment.

Nutrition and Food security: Fisheries play an important role in its contribution to nutrition and food security. Fish is a vital source of protein and essential minerals and vitamins to the diet. It is not affected by prolonged drought and therefore available all year round. Fish occurs in sufficient diverse forms to be available to rich and poor alike and to provide a diet to all.

Possible conflict areas with other agricultural sector policy:

- To promote the use of pesticides and fertilizers to raise farm productivity will lead to increase pollution in the marine environment.
- Forestry activities may increase sedimentation in coastal areas.
- Land clearing activities for housing, especially on hillsides, will increase sediment in coastal areas.
- Dam construction changes water run off patterns, reduce discharge to wetland areas.

Possible conflict areas with other policies:

- It should be noted that environmental policies supporting more effective management of the fisheries resources or conserving the marine environment may in the short term, remove fishing opportunities from the poor operators. Likewise, poverty alleviation policies may directly lead to increases in resources use and habitat destruction. Hence a “balance” must be achieved with respect to conflicting polices.
- Wetlands, sea-grass beds and coral reefs are vital to the sustainability of marine resources. Tourism-related activities including those described as “eco-friendly” can impact negatively on these resources. Hence a “balance” is need between development and conservation.

INTERNATIONAL CONVENTIONS OF SIGNIFICANCE TO THE FISHERIES SECTOR

Antigua and Barbuda has a unique Caribbean approach to treaty adoption by passing the *Ratification of Treaties Act of 1987*. The Act requires most conventions, specifically those potentially affecting national security, sovereignty or relationships with international organizations/agencies to receive Parliamentary approval through resolution or implementing legislation before the Minister of Foreign Affairs may deposit an instrument of formal acceptance.

This legislation is viewed by officials as having both positive and negative effects. On the positive side, the Act ensures public information and democratic discussions on treaty obligations and implications. On the negative, treaty adoption becomes politicised and is subject to political priorities and delays.

The following is a list of some twelve Conventions of significance to the fisheries sector. Each has varying degrees of obligations, from enacting legislation to proving reports with respect to status and statistics. Consequences of non-compliance with respect to obligations range to as far as trade sanction as in the case of CITES.

Table 13. International Conventions of Significance to the Fisheries Sector of Antigua and Barbuda.

Title	Objectives	Comments
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal Opened for signature 22 March 1989. Entered into force 5 May 1992.	To reduce transboundary movements of wastes subject to the Convention to a minimum consistent with the environmentally sound and efficient management of such wastes. To minimize the amount and toxicity of wastes generated and ensure their environmentally sound management as closely as possible to the source of generation. To assist LDCs in environmentally sound management of the hazardous and other wastes they generate.	Antigua and Barbuda signed 5 May 1993.
Convention on Biological Diversity Opened for signature 5 June 1992. Entered into force 29 December 1993.	To develop national strategies for the conservation and sustainable use of biological diversity.	Antigua and Barbuda signed 5 June 1992. Ratified 9 March 1993.

Convention on Fishing and Conservation of Living Resources of the High Seas Opened for signature 29 April 1958. Entered into force 20 March 1966.	To solve through international cooperation the problems involved in the conservation of living resources of the high seas, considering that because of the development of modern technology some of these resources are in danger of being overexploited.	Antigua and Barbuda signed 7 February 1983. Ratified 2 February 1989.
Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES) Opened for signature 3 March 1973. Entered into force 1 July 1975.	To ensure that the international trade in specimens of wild plant and animals does not threaten their survival.	Antigua and Barbuda acceded 8 July 1997. Entered into force 6 October 1997. Standing Committee recommended suspension of imports of *Strombus gigas* (Queen conch) from Antigua and Barbuda in February 1999 for failure with respect to proving annual reports and enacting CITES-enabling legislation.
Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matter (London Convention) Opened for signature 29 December 1972. Entered into force 30 August 1975.	To control pollution of the sea by dumping and to encourage regional agreements supplementary to the Convention.	Antigua and Barbuda is a contracting party
Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar)	To stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value.	Antigua and Barbuda is a contracting party.

Opened for signature 2 February 1971. Entered into force 21 December 1975.		
International Convention for the Regulation of Whaling Opened for signature 2 December 1946. Entered into force 10 November 1948.	To protect all species of whales from over-hunting. To establish a system of international regulation for the whale fisheries to ensure proper conservation and development of whale stocks. To safeguard for future generations the great natural resources represented by whale stocks.	Antigua and Barbuda is a contracting party.
Kyoto Protocol to the United Nations Framework Convention on Climate Change Opened for signature 16 March 1998.	To further reduce greenhouse gas emissions by enhancing the national programs of developed countries aimed at this goal and by establishing percentage reduction targets for the developed countries.	Antigua and Barbuda signed 16 March 1998. Ratified 3 November 1998.
Protocol of 1978 Relating to the International Convention for the Prevention of Pollution From Ships, 1973 (MARPOL) Opened for signature 17 February 1978. Entered into force 2 October 1983.	To preserve the marine environment through the complete elimination of pollution by oil and other harmful substances and the minimization of accidental discharge of such substances.	Antigua and Barbuda is a contracting party.
Protocol Concerning Specially Protected Areas and Wildlife (SPAW) to the	To protect and, as appropriate, to restore and improve the state of ecosystems, as well as threatened and endangered species and their habitats in the Wider Caribbean Region by, among other means, the	Antigua and Barbuda signed 18 January 1990.

Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region Opened for signature 18 January 1990. Entered into force 18 June 2000.	establishment of protected areas in the marine areas and their associated ecosystems.	
United Nations Convention on the Law of the Sea Opened for signature 10 December 1982. Entered into force 16 November 1994.	To set up a comprehensive new legal regime for the sea and oceans. To include rules concerning environmental standards as well as enforcement provisions dealing with pollution of the marine environment.	Antigua and Barbuda signed 7 February 1983. Ratified 2 February 1989.
United Nations Framework Convention on Climate Change Opened for signature 9 May 1992. Entered into force 21 March 1994.	To achieve stabilization of greenhouse gas concentrations in the atmosphere at a low enough level to prevent dangerous anthropogenic interference with the climate system.	Antigua and Barbuda signed 4 June 1992. Ratified 2 February 1993.

Sources: http://www.wifak.uni-wuerzburg.de/fact98/appd.html
http://www.cep.unep.org/law/cartstatus.html

REGIONAL AND INTERNATIONAL AGENCIES

CARICOM Regional Fisheries Mechanism (CRFM)

Antigua and Barbuda is an active participant in CRFM, the goal of which is to promote the management and conservation of fishery resources of CARICOM countries to permit their exploitation on a sustainable basis. The predecessor to CRFM, CARICOM Fisheries Resource Assessment and Management Program (CFRAMP), was a joint project between the Canadian International Development Agency (CIDA) and member countries of the Caribbean Community. The main purpose of the CRFM is to set up and or enhance the basic information and institutional capacity necessary to manage and develop fisheries in CARICOM region.

Since its inception Antigua and Barbuda has benefited in the following ways:

- Training at the Masters level for two Fisheries Officers
- Short-term attachment training in other CARICOM countries in fisheries data collection
- Participation in other short-term training workshops relating to fisheries management
- Assistance in completing a five-year management plan;
- Establishing a catch and effort and biological data collection system
- Provision of a fisheries database software to store data on fishers, vessels, catch and effort, and biological data on fishery resources;
- Survey of ciguatoxic areas around Antigua and Barbuda and identify potential ciguatoxic species;
- Marine habitat mapping;
- Technical assistance and funding to conduct a conch abundance survey; and
- Education and community involvement projects

OECS Environment and Sustainable Development Unit (OECS-ESDU)

The OECS-ESDU has assisted the Fisheries Division in the following areas:

- Training of staff in short and long-term courses
- Training of fishers

- Assistance in developing and funding small grant projects aimed at fisheries management and development

Japanese International Cooperation Program (JICA)

With the assistance of the Japanese Grant Aid, fisheries complexes have been constructed at the West Bus Station in St. John's, Urlings and Parham. A fourth, the Point Wharf Fisheries Complex is schedule to be completed in December 2005. Plans are also in the pipe for similar facility in Barbuda. The main objective is to stimulate the development of the fisheries sector through the provision of better infrastructure for wholesaling and retailing fish (e.g., cold storage and ice-making facilities), berthing facilities for fishing vessels, and lockers and amenities for fishers.

Food and Agriculture Organisation of the United Nations (FAO)

Over the past years FAO has provided assistance in the following area:

- Drafting of fisheries legislation
- Assistance in developing a national plan of action to address Illegal, Unreported and Unregulated (IUU) fishing
- Drafting of standards for fishing vessels construction
- Assistance in the assessment of the infrastructure requirement for fisheries trade

FISHERIES DEVELOPMENT PLAN 2006 – 2010

PLAN 1: Preparation of a Comprehensive Fishery Management Plan

The preparation of a plan to manage the marine resources of Antigua and Barbuda waters is seen as priority. In the past development efforts concentrated on technological innovations (improved vessel and gear) components of the sector than upon environmental and resource management. It is often not borne in mind that the resources are finite and exhaustible, thus stimulating growth in this way has lead to declining fish stock in some areas. Added to this unrestricted access and environmental degradation, through habitat destruction, has exasperated the problem. **Antigua and Barbuda does not have the "buffer capacity" to tolerate a collapse in the fishery. For this reason, the management of the fishery and technological innovations must go hand in hand in the development process.**

It is desirable that development of the fishery (under exploited or not) do not lead to overexploitation, which can be avoided by judicious management. Management of species already considered over exploited may be impossible unless alternative opportunities are provided as an integral part of the development projects. Any fishery can be over exploited. Overexploitation is not a desirable end product of development and increasing attention is being directed towards sustainable development.

For this reason a comprehensive Plan for the Management of the Marine Fisheries Resources of Antigua and Barbuda has been prepared after much consultation with fishers and other interested individual and groups in the society. The plan is presently being revised and is being prepared as a separate document.

The new legislation of 2006 should be rigorously enforced. Positive steps must be taken to prevent the increasing incursions of foreign fishermen who appear to employ even smaller mesh pots than local fishermen. It is reported that since 1978/79 up to 150 foreign vessels have been regularly fishing in Antigua/ Barbuda waters.

PLAN 2: Preparation of Management Plans for the Various Marine Reserves

The fisheries sector depends on the fragile and easily damaged natural resource base, both in terms of integrity of fish habitat and the

fish stocks to intensive exploitation. Fish habitats including mangroves, coral reef and sea grass beds, are subjected to various kinds of man-made environmental stresses including: sewage; effluent disposal form coastal population centres; sea traffic; upland agriculture; deforestation; yachting and diving and other shore line alterations; and over fishing

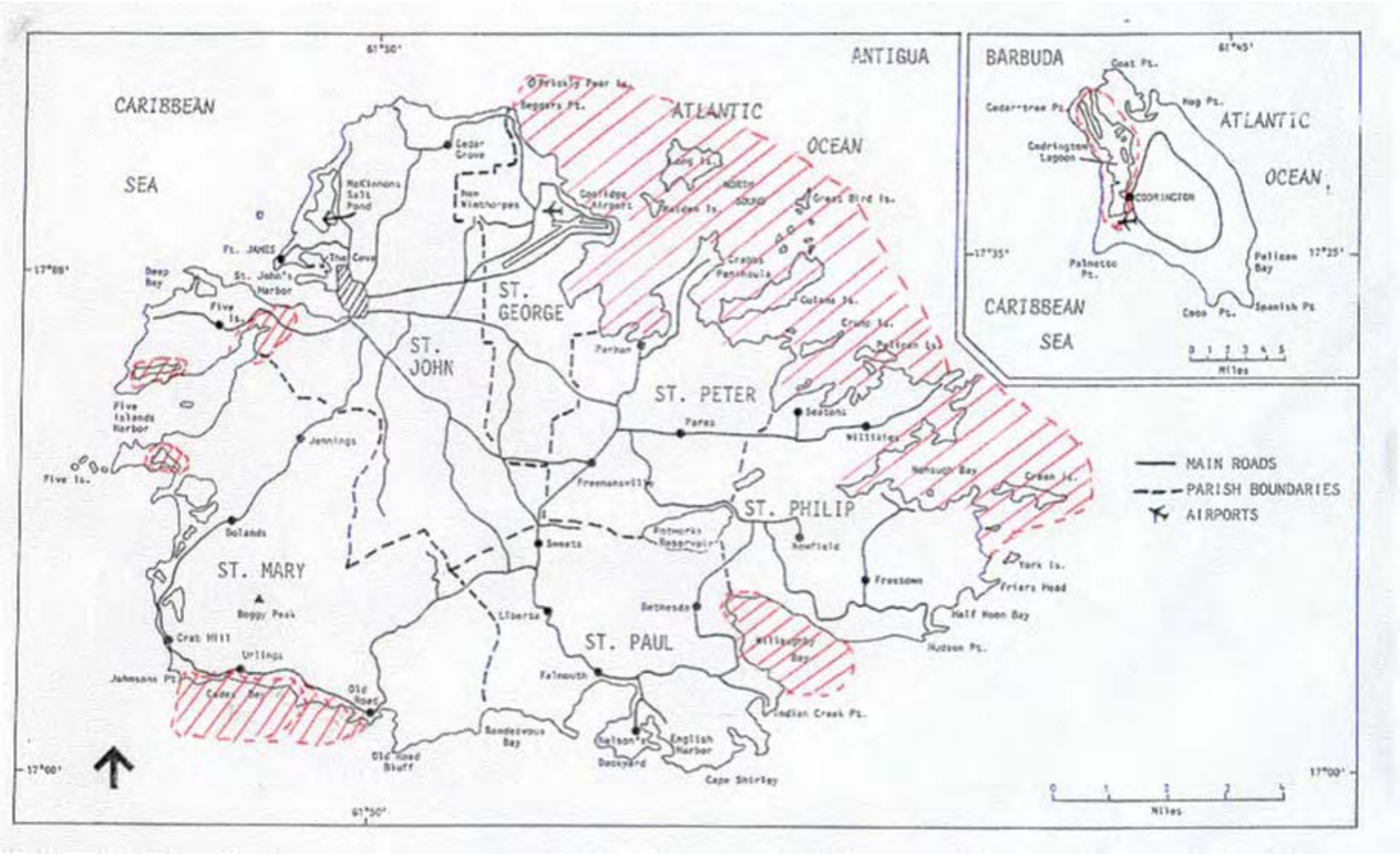
At present four marine areas are now managed by the Fisheries Division – Diamond reef, Cades Bay Marine Reserve and the North East Management Area off Antigua and Palaster Reef off Barbuda. The Barbuda Lagoon has been declared as a national park.

The Objective of marine habitats are:

- Maintaining the bio-diversity, and
- To create interesting marine environment for the tourist trade.

Proposed Areas to be declared Marine Reserves.

AREA OF MANGAL	APPROX. SIZE (1991)	REASONS FOR SELECTIONS AS A MARINE RESERVE
Hanson Bay and the Flashes	225 ha.	Large system that suffered extensively from storms and the effects of anthropogenic activities. Has strong potential for recovery Important to fisheries and the marine environment
Pinching Bay Mangals	2 ha.	A healthy system that has some potential for fisheries. Very little degradation, thus the need to protect.
Yorks Salt Pond	1 ha.	Important nursery area for marine organisms. Used to be a safe haven during storms.
Valley Church Mangals		
Willoughby Bay / Christian Cove	5 sq. ml.	Linked to sea grass beds and offshore coral reefs. Supports important fisheries activity including cockle harvesting. Sizable system with some degradation and therefore should be protected.


ANTIGUA
CARIBBEAN
SEA
ATLANTIC
OCEAN
ST. GEORGE
ST. JOHN
ST. PETER
ST. PHILIP
ST. MARY
ST. PAUL
BARBUDA
ATLANTIC
OCEAN
CARIBBEAN
SEA
COOLINGTON
MAIN ROADS
PARISH BOUNDARIES
AIRPORTS
Miles

PLAN 3: Utilization of Under Exploited Species

The objective is to shift focus from the generally fully-exploited demersal fishery resources of the coastal areas to the under exploited resources of the off-shore and deep slope stocks.

It is generally considered that the large pelagic resources provide one of the few areas for expanding fish production in Antigua and Barbuda. Due to the lack of reliable data, there are considerable uncertainties about the status of these resources and any action taken towards development should be based on conservative assumptions, in keeping with the Precautionary Approach to fisheries when confronted with complexities and uncertainties. The guidelines to the Precautionary Approach to Fisheries emphasize that sustainable utilization requires the application of prudent foresight, and suggest that this includes among other attributes the following:

- The avoidance of change that are not reversible;
- That where there is uncertainty, primary attention should be given to conserving the productive capacity of the resource;
- The prior identification of undesirable outcomes and of measures to avoid them;
- That the fishing and processing capacity should be in harmony with the production potential of the resource, to avoid continual social and economic pressure to over-exploit the resources in order to utilize this capacity; and
- That all fisheries should be conducted according to an explicit and appropriate management plan and that the administrative and legal framework exist to ensure implementation of the plan.

It is the plan to follow this Precautionary Approach and the plan is to initially allow six boat to enter this fishery. By monitoring the catch from these six boats (including biological data) and by other independent means of assessing the status of the fishery, the decision would be made whether to allow further expansion.

There are a variety of other under-exploited resources which collectively offer potential for local benefit. As indicated earlier development of these potential must be on a scale appropriate to the size of the specific resources. Improved estimates of abundance and sustainable yields are absolute prerequisites to such development.

Such species may include the harvesting of invertebrates (particularly bivalve and gastropod, molluscs, echinoderms, octopi, sea cucumbers. The actual potential of un - or under exploited species cannot be determined without specific evaluation in terms of sustainable yields as well as market demand, but such evaluation must be done to promoting anything more than an experimental harvest of these species.

Projects:

1.To assess the potential of the coastal and offshore pelagic, including market potential.
Constraints: lack of vessel and gear; lack of expertise; lack of data on these seasonal species which may themselves be over exploited. (Knowledge of the status of these stocks are limited.

2. The above could be partly conducted through demonstration fishing. Objective:
- to explore fishing grounds presently beyond the reach of the local fishermen;
- to demonstrate the types of gear and boats most appropriate for this kind of fishing operation;
- to determine this kind of fishing operation;
- to train local fishermen in new fishing techniques, whether for the present range of operations, or for an expanded fishery;
- to document findings in relation to resources, fishing techniques, fishing areas, seasonality, and make such information available to local fishermen; and
- to make information available to local fishermen, and to resource assessment and management agencies in the region and internationally.

3. Financing and training for six boats specifically to target the offshore pelagic including larger more equipped boats to enable fishermen to stay at sea for several days.

4. Benefits: increase private sector investment; more employment, not only for fishermen, but also to support existing and new infrastructure industries.

PLAN 4: Infrastructure Development

The lack of infrastructure facilities to assist fishermen with landing their boats and catch has been a major constraint to the development of the fisheries sector as whole. The lack of facilities imposed additional stresses on an already difficult occupation,

fragment the efforts of the fishermen, impeded the rate of development of the industry, and had a negative impact on the quality and productivity of the fishery. This problem has been mostly alleviated with the construction of four Japanese government sponsored fisheries Complex at Market Wharf, Parham, Urlings and Point Wharf.

However there are still some where the boats were hauled out on beaches devoid of ramps or other structure for that purpose; where fishermen are forced to carry their gear and equipment to their homes and a lack of facilities for storage and the proper handling of fish.

The table below outlines what further developments are needed at landing sites throughout Antigua and Barbuda. The central objective to these developments is to improve fish quality, through the provision of better landing and handling facilities, so that fishermen may realize greater economic return. Another objective is to ensure the available land space to allow fishing operations to continue.

Landing Site	**No of Boats**	**Land Owner**	**Facilities Required**
Primary Sites			
Point Wharf	35	Government	Tourism linkage / community involvement projects – kiosks
Market Wharf	26	Government	Improvement to the Public Fish Market: enclosed with display freezers for fish, toilet / shower facilities
Keeling Point	27	Government	Onshore facilities: administration building (office, meeting room, parts shop, dry storage), fishermen lockers. Area for repairs to boats and gear, boat haul-out facility including a haul out ramp a travel lift to raise boats and transfer to sites on the landing site. Land area also to be used to haul out boats during hurricanes. Tourism Linkage: kiosks, board walk,

Codrington Barbuda	42	Government	Onshore facilities: administration building (office, meeting room, parts shop, dry storage, ice making / cold store facilities, fish retail and marketing facilities, lobster storage tanks), fishermen lockers. Area for repairs to boats and gear, boat haul-out facility. Land area also to be used to haul out boats during hurricanes.
Jolly Harbour / Mosquito Cove	20	Private	Jetty, available land for hauling out boats and parking.
Urlings	13	Private	Additional berthing space
Falmouth Harbour	22	Government ? (private)	Jetty Land area also to be used to haul out boats during hurricanes, parking and repair of boats
Parham	11	Government	Tourism linkage / community involvement projects – kiosks
Secondary Sites:			
Morris Bay, Old Road	4	Government	Gear shed Land area also to be used to haul out boats during hurricanes, parking and repair of boats
Carlise Bay, Old Road	6	Government	Land area also to be used to haul out boats during hurricanes, parking and repair of boats
Mamora Bay	3	Government	Jetty, gear shed Land area also to be used to haul out boats during hurricanes, parking and repair of boats.
Thomas Bay, Willoughby Bay	6	Government	Land area also to be used to haul out boats during hurricanes, parking and repair of boats
Mill Reef Club	4	Private	Jetty Land area also to be used to haul out boats during hurricanes, parking and repair of boats
Emerald Cove, Willikies	13	Private	Jetty, gear shed Land area also to be used to haul out boats during hurricanes, parking and repair of boats

Seatons	8	Government	Jetty, gear shed, haul out facilities Land area also to be used to haul out boats during hurricanes, parking and repair of boats.
Crabbs	5	Private	Jetty Land area also to be used to haul out boats during hurricanes, parking and repair of boats.
Minor Sites			
Crabb Hill	1	Private	Available land space to allow operations to continue
Johnson Point		Private	Available land space to allow operations to continue
English Harbour (Tank Bay)	11	Government	Available land space to allow operations to continue
Joyce bay (Willoughby Bay)	3		Available land space to allow operations to continue
Muddy Bay, Willikies	2	Government	Available land space to allow operations to continue
Rooms, Willikies		Government	Available land space to allow operations to continue
Fitches Creek	1	Government	Available land space to allow operations to continue
Shell Beach	9	Government	Jetty Land area also to be used to haul out boats during hurricanes, parking and repair of boats.
Royal Bay, Hodges Bay	1	Government	No space
The Cove, Dredge Bay	1		Land area also to be used to haul out boats during hurricanes, parking and repair of boats.

PLAN 5: Hurricane Shelters

The fisheries sector of Antigua and Barbuda suffered severe set backs from a series of major hurricanes in the 1990s. Fishing boats were seriously damaged, and thousands of fish traps destroyed, resulting in a loss of income for many fishermen. Hurricane disaster planning has been ad hoc and piecemeal, and for the most part, never completed or implemented. The rebuilding of the sector is almost completely dependent on the availability of funding from regional and international donor agencies, sought for after the event has taken place.

Early warning systems could go a long way in preparing the sector for what is to come, and every means necessary should be employed to get the information out, from the use of all media sources available, to sending runners to the landing points. However,

the ultimate responsibility for hurricane preparedness and impact mitigation lies, first and foremost, in the hands of the fishermen and then agencies involved in the management of the sector. Fishermen should take all precautions to secure their boats on land or in the water. The government agencies could assist by making available hauling equipment, ensuring that adequate space is provided for storage and shelter, preparing evacuation plans, and in the organizing and coordinating all preparation activities.

There are medium to long term strategies which the management authorities should pursue in order to have an adequate and comprehensive impact mitigation plan. These include training and public awareness programs using all communication media. Capacity building programmes aimed at strengthening the capacity of the fishermen to implement their own loss replacement and providing them with the means to restart as soon as possible after the event. Vulnerability reduction programmes to enable the sector to better withstand the impact of storms, including such things as a regional group insurance scheme and revolving loans. Loss replacement programmes to enable the fishermen to restart as soon as possible after the event, and include making loan and credit facilities available to fishermen. Finally, in addition to the physical and material support, it is necessary to provide counseling and psychological support for those hardest hit, to enable them to cope and respond adequately to the impacts of the disaster.

Although much of the responsibility for preparedness lies with the fisherman, the government is still responsible for the following:

X Providing areas where boats can be hauled onto the land: Suggested site Keeling Point, St. John's

X Identifying, developing and maintaining areas to be used as hurricane shelters. This should include providing permanent moorings to allow vessels to moor to, rather than to the mangrove roots. (Priority site Fitches Creek)

X The Coast Guard should assist in traffic regulation at designated sites to ensure the proper utilization of space.

$ Prepare an evacuation plan for each landing site.

Projects ideas could be developed around each one and funding sought.

1. Education and Public Awareness Programmes. This should be planned and executed by the Fisheries Division and could commence immediately. These may include:

i. News paper articles focusing on fisherman related issues, for example, on the safety of fishing vessels.
ii. Also preparation of leaflets, brochures by the Fisheries Division for fishermen.

iii. Workshops and exercises with fishermen at landing sites

2. Capacity Building Programmes.

This should be aimed at strengthening the productive capacity of the fisherman to implement his own loss replacement, including providing the fisherman with the capacity to startup fish production as soon as possible after. This is also mainly the responsibility of the Fisheries Division collaborating with other government agencies and donors overseas.

i. These should include training programs such as:
   - X The making of collapsible fish pots. This will allow fishermen to retrieve their gear, especially those set in shallow water.
   - X Introduce other methods of fishing to encourage fishermen to diversify. Fishermen who use lines and methods other than the fish traps, and who had no boat damage, were able to restart immediately following the storm.
   - X Basic seamanship, with emphasis on the rules of the road and effective rigging. Most fishermen have had no formal training in seamanship and gather knowledge from older fishermen or learn from personal experience. Formal classes can speed up the learning process.
   - X Boat building, repair and maintenance, to allow the individual to carry out quick repairs to vessels following a storm.

ii. As is done for the restoration of the electricity supply to the island following a major storm, volunteer working teams from other islands or from other communities could be organized to provide additional personnel to augment the efforts in the sector to rebuild (e.g. teams of boat builders, jetty builders, fish pot builders, etc.)

iii. Strengthening existing cooperatives and developing new ones where they presently do not exist. In these groups fishermen could assist each other through various schemes such as loans, joint ownership of trailers, hiring a crane for hauling, maintenance of safe storage areas etc.

3. Vulnerability reduction programmes- Projects are needed to help to reduce the vulnerability of the fishermen household to poverty and malnutrition as a result of factors such as market lost; shortage of inputs for startup. It is important to prevent the collapse of the fisheries sector and the potential social unrest. This should be the joint responsibility of the National Office of Disaster Services and the Fisheries Division

i. Ensure a good supply of mesh wire, line etc. is available on the island just prior to the hurricane season. After a storm, airports and especially sea ports are usually closed for some time, depending on the amount of damage. The result is a shortage of supplies. As with building material after a storm, all items for the rebuilding and repairing boats (marine lumber, fibreglass, etc.) should be allowed in free of duty.

ii A regional group vessel insurance scheme could be developed, along the same lines as the OECS Fishing Vessel Insurance Scheme, 1990. At the time when this was developed, in the absence of a major disaster, fishermen saw no need to for insurance. (General insurance companies do not generally insure fishing boats and especially wooden vessels, and if they do it is done at high premiums and interest rates.) The possibility of a national insurance scheme could be explored.

iii. Developing a revolving loan scheme through the cooperatives or through the development banks, to be used only in times of disaster. The funding for this scheme could be obtained from various sources including international funding agencies.

iv. Assistance for the timely repair of infrastructure, vessels etc. (The new Japanese funded fisheries project should go along way in alleviating the problem of the supply of ice to to the fishermen following a storm.

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4. Loss replacement programmes. These programmes should aim at the replacement of property (vessel and gear). In the absence of insurance complete loss replacement may be possible. This is the approach being used now, and it include

i Projects to get funds to purchase inputs, such as mesh wire and other gear, to rebuild infrastructure etc. One of the draw backs to this method is that most of the time the assistance comes long after the event (Hugo - 6 months, Luis - 10 months). Fishermen had to draw on their own resources to keep going. The benefit is that the assistance enabled the fishermen to rebuild the number of fish traps to nearly pre-hurricane levels in a much shorter time than would otherwise be possible.

ii. Projects to buy fishing gear on credit to be paid for later

iii. Loans through the development bank at no or low interest.

5. Personal coping mechanisms programmes:- There are cases where the effect of the disaster may have so damaged the home and the community that the household is unable to revive itself and respond to post-disaster activities. There may be a need for counseling,

psychological stress management etc. Some of this may require projects to refer the fisherman and or family members to counseling. This should be the responsibility of the National Disaster Preparedness Services.

This is a largely ignored area in Antigua and Barbuda. This could be done through

i. Post-trauma support groups among fishermen.

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ii. Referral for counseling.

iii. Assistance in restoring the farm household to normalcy.

iv. Forming key strategic allegiances among producers for short term post harvest response and long term disaster mitigation.

PLAN6: Aquaculture / Mariculture Development:

Presently there are no aquaculture activities in Antigua and Barbuda. The low rainfall is a constraint to fresh water aquaculture, but there is a potential for mariculture development. The many sheltered bays and adjacent lands are suitable for aquafarms. The FAO "Regional Cooperation for Aquaculture Development in the Caribbean" study (1981) recommended that the best possibilities would be the grow out of snapper and grouper in cages for grow-out, and the culture of Crustacea, as there was a demand for high quality fish locally and for export. Marketing channels already exist for these species. Sea moss culture was also recommended. The value and precarious status of natural conch resources is enough reason for some effort to be put into mariculture for conch, either by culture or by ranching, to provide juveniles for "re-seeding" depleted areas.

There is a need for mariculture:

- To diversify the narrowly based economy;
- To increase the use of available and not fully utilized natural species;
- To present opportunities for development of aquaculture suited for small holders/fishermen and private entrepreneurs/ multinational companies;
- To increase foreign exchange;
- To reduce imports of fish imports;
- To re-establish fisheries where over fishing seems to be taking place;

The project will commence at the research level. It is proposed that the Valley Church site be designated as the research station site for the following reasons:

- It was the former site for such a project, although the building has been striped bare the raceways still exist, and the land actually belongs to the Fisheries Division.
- It is adjacent to the ocean, with no significant freshwater drainage (which will influence the salinity levels), and away from most pollution source.
- The site is protected by the headland
- Easy access to the main read, power supply.

Projects:

1. To undertake a detail assessment of the aquaculture potential of Antigua and Barbuda and prepare an aquaculture development plan

2. Training of an aquaculture / mariculture specialist

PLAN 7: Improve Marketing; Quality Assurance; Value added Products

Objective:

1. To produce value added product. The present practice is to of import value products while exporting lower value products.

2. To increase fish supply- the better utilization of discards and by catch and the improvement of post harvest practices.

3. Improve post harvest management and marketing with a view to ensuring the best use is made of resources and post harvest loses minimized.

4. To develop marketing mechanisms which will, in the first instance serve to stabilize the existing domestic and export fish marketing system, and later as resources become available, provide an effective means of marketing any increase in production. Improving the quality of the catch through improved handling and preservation methods.

5. To providing mor fish to the population

Project:

- Research undertaken to develop a market profile for fish and fish products
- Experimental production of value added fish products at the cottage industry level;

PLAN 8: Institutional and Organization Strengthening

The main task is to strengthen fisheries administration, both in staffing and in the quality of staff. It is believed that the Division has the core staff needed and others will be recruited on a "when needed basis" to fisheries strategic planning.

Assistance in building the capability of cooperatives and associations is necessary. This will involve strengthening of existing structure of fisheries cooperatives, and the identification and training of cooperative personnel, allowing them to better perform their functions. Proper functioning cooperatives will provide an excellent vehicle for implementation of management and development plans.

The Fisheries Advisory Committee needs to be re-organized.

PLAN9: Development of Extension Services

The Division recognizes the need to improve services in Fisheries Extension and training. This will require extension training for fisheries officers.

It is anticipated that topics to be covered in extension and training component would include:

- Diversifying fishing methods (including the use of larger boats) which provide fishermen with access to offshore fishing grounds and to other species;

- Providing organization and training assistance to the fishermen cooperatives;
- Training in elementary business practices associated with fishing;
- Developing programs of public education to deal with enforcement and sustainable development issues
- To stop or minimize the gradual destruction of the mangrove forests, which are rich spawning, breeding and fish feeding areas, cause mainly by the expanding tourist industry and residential areas;
- To simulate interest in fisheries development through a public awareness programme;
- Assisting fishermen and divers with accessing technical information about coping with problems associated with diving in deeper waters;
- Introducing concepts in marine resource conservation, particularly with respect to the use of larger mesh sizes for nets, the consideration of closed season for selected species, biodegradable panels etc;
- To inform fishermen and others in the community about the Fisheries Development programme before it is introduced;
- Introducing better handling and storage procedures for fish
- To train fishermen in basic seamanship, navigation and safety at sea;
- To train persons in aquaculture / mariculture.
- To construct a marine profile of Antigua and Barbuda, which clearly delineates the condition of the present reefs and the impacts the changes in the reefs may have on future marine life, and disseminate this information to the public
- To protect marine habitats through public education and awareness programmes.
- Stimulating interest in fisheries development through a public education and awareness programme;
- Supporting local community groups and non-governmental organizations in the promotion of improving greater

utilization of fish;

- Improving communication among fishermen, between fishermen and government departments, regarding the potential of fishing industry and its contribution to national development goals;

- To identify the role of fisheries in supporting other industries, especially tourism. In planning for long-term fisheries development, the characteristic of fisheries contribution should be carefully articulated and highlighted, particularly its role in reducing food importation and achieving self-sufficiency in food.

- Training of local boatbuilders to improve the efficiency of local vessels;
  STraining local fishermen in the repair and maintenance of diesel engines.

- Fish preservation / processing - icing and basic food hygiene

- community involvement in fisheries management.

- Organization of fishermen groups and promoting their participation of management measures. This is considered an important element of institutional framework for fisheries management.

- Greater attention will be given to education in creating awareness of the inter-relationship between the terrestrial and marine components of the coastal zone.

PLAN10: Development of Fisheries Information System

All fishery development plans require specific information on target species; stock abundance and sustainable yield are of most interest. A variety of methods will be used to estimate the absolute or relative abundance and yield potential of fishery stocks, including:

- estimates based on catch and effort statistics
- analysis of age composition data of several years' catch (virtual population analysis)
- acoustic surveys

- aerial surveys
- experimental fishing
- estimates base on tag-recapture studies
- estimates based on visual census.

The information to be collected and maintained should include accurate data such as:

- an accurate register of fishermen by location,
- an accurate register of vessels by location, type, size, engine size,
- types and numbers of gear in operation,
- monthly fish production by fishing ground, species, volume,
- monthly imports and exports by commodity, volume and value.
- monitor the impact of various developments and human activities, such as tourism, pollution, etc. on the marine and coastal environment.

In the absence of reliable data, the situation which now exists, it is extremely difficult for the Fisheries Division to engage in meaningful development planning or to take timely measures for the management of the resources as provided for under the Fisheries Act of 1983.

PLAN 11: Setting Standards for Fishing Vessels

There is in place a fishing vessel licencing registration and inspection system, which is one of the task of the Division. However, in order to guide this system, there is the urgent need for an appropriate policy, and legal backing to set minimum standards fro fishing vessel construction and outfitting, and classification. The actual specifications will have to be incorporated into the fishery regulations.

Currently, various types of used vessels, some of which were condemned in other countries, and others which are not suitable to the local sea conditions are being introduced into the fishery.

These standards for fishing vessel will facilitate the following:

- the boat building industry, in that they will be able to compete more effectively, and build better and safer fishing boats;

- the application for loans, in that the lending institutions will have more confident in their investment;

- the insurance coverage of fishing vessels, which will also assist in securing loans. It may also cause a reduction in insurance premiums which is considered by fishers to be extremely high.

- the modification of vessels into fishing vessels; and

- the management and conservation of the fishery through the diversion / control of fishing effort.
  These standards would only affect new vessels entering the fishing fleet or for the modification of vessels to fishing. It will not be possible to bring existing fleets up to acceptable standards, which means that a "grandfather" clause will have to be introduced in the fisheries regulations to cover these vessels.

The Chief Fisheries Officer is the person responsible for issuing a certification of inspection to fishing vessels. However, the person is not technically trained to make an assessment of seaworthiness of fishing vessels, and in the event of litigation, the Chief Fisheries Officer can be discredited as being technically incapable. In order for the Fisheries Division to be legally covered, a qualified inspector (of fishing vessels) should be employed (full-time or part-time) as the competent staff person, on whose recommendation the Chief Fisheries Officer will sign the certificate of inspection. The person will also be the buffer between the Chief Fisheries Officer and the boat owners.

PLAN 12: Revision/ Updates of the Fisheries Legislation

[done]

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DRAFT Standard Sanitation Operation Procedure Manual for the Safe Handling of Fresh Fish at Point Wharf Fish Processing Plant in Antigua and Barbuda

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Standard Sanitation Operation Procedure Manual for the Safe Handling of Fresh Fish at Point Wharf Fish Processing Plant in Antigua and Barbuda

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Preface

This Manual is guided by the Codex Alimentarius “Recommended International Code of Practice for Fresh Fish “(CAC/RCP 9-1976, FAO), “the HACCP Competencies for QC/Plant Manager/Supervisors Facilitator’s Guide” and “an introduction to HACCP for fish processors” (ACEAN-CANADA Fisheries Post-Harvest Technology Project-Phase II).

Purpose of the Manual

Over the past years HACCP/Own-checks has become the universal standard for regulating food safety with respect to trade. By focusing on prevention rather than the traditional end point detection of food hazards, products produced under HACCP or Own –checks are safer. With this in mind, the Fisheries Division of Antigua and Barbuda designed these standard procedures to assist fish processors produce safe and wholesome products, especially the Fresh Fish Snapper and Mix fish. The decision to produce a standard procedural manual for the safe handling of Fresh Fish was based on the similarity in processing steps among all processors and the minimal handling / processing involved. Fish processors are expected to comply with the procedures outlined in this manual 100% of the time. The Chief Fisheries Officer must authorize any deviation from the standard.

This Manual is also intended to serve as a tool to be used by the Fisheries Division and other authorized agencies in the evaluation of fish processors.

Amendment Record

This manual will be reviewed on a yearly basis and any amendments make shall be noted in this record.

Amendment Section and Page Number	Date of Issue	Remarks	Entered By and Date

Definitions

Boxed stowage	The storage of fish on board the vessel in boxes.
Carrier	A person or animal that harbors and may transmit pathogenic or harmful micro-organisms without showing signs of illness.
CFO	Chief Fisheries Officer
Chilling	The process of cooling fish to a temperature approaching that of melting ice.
Chilled sea water	Clean sea water whose temperature is 0℃ (32℉) or slightly below.
Clean	Free from visible dirt or filth.
Cleaning	The removal of objectionable matter from surfaces.
Cleaning Schedule	A summary of the cleaning task identifying what is to be cleaned, how it is to be cleaned, who is responsible for cleaning, what cleaning agents to be used and when cleaning is to be done.
Clean sea water	Sea water which meets the same microbiological standards as potable water and is free from-objectionable substances.
Contamination	To introduction of harmful substances or micro organisms into food or water.
Corrective Action	Procedure followed when a deviation from SOP occurs at a critical control point e.g. Procedures followed when the log mean the temperature 3.0℃ or less.
Criteria	Limits of characteristic of a physical (e.g., time or temperature), chemical (e.g., concentration of salt), biological (e.g., bacterial count) or sensorial nature.
Critical Control Point	Is an operation (practice, procedure, location or process) at which control can be exercised over one or more factors to eliminate, prevent or minimize a hazard.
Critical limit	A level or limit which once exceeded makes it critical; A criterion that must be met to control each critical control point e.g. log mean the temperature 3.0℃ or less.
Disinfection	The application of hygienically satisfactory chemical or physical agents and processes to clean surfaces with the intension of eliminating micro-organisms.
Fecal coliforms	A group of potentially harmful micro-organisms normally associated with animal faeces (mainly human). They are often used as indicator organisms for determining water quality.
Fillet	A slice of fish of irregular size and shape removed from the carcase by cuts made parallel to the backbone.
Fish	Any of cold-blooded aquatic vertebrates' animals commonly known as such. This is includes Pisces, Elasmobranches, and Cyclostomes. Aquatic mammals, invertebrate animals and amphibians are not included. It should be noted, however, that many of the recommendations given here also apply to certain invertebrates, particularly Cephalopods.
Fresh fish	Freshly caught fish which have received no preserving treatment or which have been preserved only by chilling.
FO	Fisheries Officer
Gutted fish	Fish from which the guts have been removed.
HACCP	(Hazard Analysis Critical Control Point) A food safety and quality assurance system that focuses on preventing potential food hazards from occurring, by monitoring critical procedure/steps/stages (called critical control points) in food production.
Hazard	Anything in the total food operation that might contaminate the food and make it unsafe for the consumer, or that can mislead consumer, making the firm liable. Contaminants can be biological (micro-organisms, parasites), chemical (histamine, pesticides), or physical (dirt, filth).
Hazard Analysis	Consist of an evaluation of all procedures concerned with the production,

	distribution and use of raw materials and food products to: 1. indentify all potential food safety hazards; 2. identify the potential sources and specific points of contamination; 3. assess the risks and severity of the hazards identified; and 4. determine if the potential food safety hazards are significant.
Hygienic	Free of harmful levels of contaminants, including harmful micro-organisms and chemicals.
Keeping time	The length of time that fish will remain wholesome and acceptable as human food.
MA	Manager of Point Wharf Processing Unit
Market	An area or building used for the display and sale of the catch.
MS	Maintenance Supervisor
Packaging materials	All those materials such as foils, films, wax paper, cartons and boxes, used for covering and protecting the fresh fish or fresh fish products, and which are approved by the official agency having jurisdiction.
Plant or establishment	The building or buildings, or part thereof, used for, or in connection with, the manufacture of holding of food for human consumption.
Potable water	Fresh water fit for human consumption. Standard of portability should not be lower than those contained in the latest edition of the "International standards for Drinking Water", World Health Organization.
Pounds or pens	Area in the fish hold and on deck, divided off by stanchions and portable or fixed board structures for the storage of fish.
QC	Quality Control / Quality Control Officer
Refrigerated brine	A solution of food grade salt (sodium chloride) in potable water of about the same salinity as sea water which is cooled in the same manner as refrigerated sea water.
Refrigerated sea water	Clean sea water cooled by the addition of ice prepared from potable water or clean sea water and / or a suitable refrigeration system. Its salt content is normally about 3 percent.
Rigor mortis	The stiffening of the muscles of an animal which results from a series of complex changes that take place in the tissues shortly after death. Immediately after death, the muscles are soft and limp and can be easily flexed. At this time, the flesh is said to be in pre-rigor condition. Soon the muscles begin to stiffen and harden and no longer contract by stimulation. The animal then is in rigor. After some hours or days, the muscles gradually begin to soften and become limp again. This is called the post-rigor condition.
Risk	An estimate of the probability of a hazard occurring.
Severity	The magnitude of the hazard, or the seriousness of the possible consequences.
Shelf stowage	The storage of fish on board the vessel in single layers, on shelves.
Steak	A section of fish, removed by cutting approximately at right angle to the backbone.
Suitable corrosion-resistant material	Impervious material, which is free from pits, crevices and scale, is non-toxic and unaffected by sea water, ice, fish slime or any other corrosive substance with which it is likely to come in contact,. Its surface must be smooth and it must be capable of with standing exposure to repeated cleaning, including the use of detergents.
PS	Plant Supervisor
Validation	The initial review of the processing steps by the Fisheries Division to ensure that the processor is in compliance with the standards set in this manual.
Verification	The use of methods, procedures, or test in addition to those used in monitoring that determine if the processor is operating under the standards set in this manual.
Whole fish	Fish as captured, ungutted.

Training Requirements

At a minimum, the following functions should be performed by an individual who has formal training in the application of HACCP principles to processing.

a) The training of employees;
b) Quality control;
c) Review of daily records; and
d) Internal verification of processing steps.

All employees involved in the processing of fresh fish should be familiar with the relevant sections of this manual that pertain to their duties. It is the responsibilities of the processor to ensure that employees are properly trained and the requirements outlined in this manual are met.

In order to meet the training requirements, the Fisheries Division will provide assistance in the form of workshops, seminars, and personal consultation wherever possible.

Records pertaining to the training of employees should be kept on file.

Personal Hygiene and Health Requirements

All persons, to include fishermen, processors and occasional workers, handling fresh fish must maintain a high degree of personal cleanliness while on duty and must take all necessary precautions to prevent contamination of fresh fish with foreign substance.

All persons handling fresh fish should wear clean light-colored or white protective clothing including a head covering, all of which are either washable or disposable. Protective clothing should be washed separately. The use of waterproof aprons where appropriate, is recommended.

All visitors to fresh fish handling areas should observe the same hygiene rules and wear the same protective clothing as employees engaged in the handling of fresh fish.

Any behavior, which can contaminate the fresh fish such as spitting, eating, smoking or chewing of gum should no be allowed.

Insecure jewellery and other loose objects should be removed when fresh fish are being handled.

If gloves are used to handle fresh fish, they should be maintained in a sound, clean and hygienic condition. Gloves should be made of an impermeable material except where their usage would be incompatible with the work involved.

Minor cuts and abrasions should be appropriately treated and covered with a suitable waterproof dressing. Adequate first aid facilities should be provided to meet these contingencies so that there is no contamination of fresh fish.

No person who is known or suspected to be suffering from, or who is a carrier of a disease likely to be transmitted through food or has infected wound or open lesion should be engaged in the handling of fresh fish.

Processors must maintain on file current medical certificates attesting to the health of all employees and present them to the Public Health Inspector and the fisheries Officer when an inspection is made.

Raw Material Requirement

Fresh fish are an extremely perishable food, and should be handled all time with great care and in such a way as to inhibit multiplication micro-organisms.

Fish quality deteriorates rapidly, and the potential keeping time is shortened if they are handled and stored properly. Much of the fish landed for human consumption is unfortunately subjected to fairly rough handling treatment which should be avoided. Fish should not be exposed to direct sunlight or to the drying effect of winds, or any other harmful effects of the elements, bud should be carefully cleaned and cooled down to the temperature of melting ice, 0℃, as quickly as possible. Any careless treatment or delay in reducing the temperature of the fish will have a marked effect on their potential keeping time.

Fish intended for marketing as fresh fish should be of the highest possible quality.

Although there are many aspects that might be taken into account when defining what is meant by “highest possible quality” fish, there are two major ones that should concern the fisherman as a primary producer.

1) quality of fish when caught; and
2) quality of fish on delivery to the buyer or the processor.

The first one is determined by the physical condition of the fish, and includes appearance, size, percentage of fat, amount of feed, damage to skin, presence of disease and of harmful substance. The second one will result from the method and techniques employed in fishing practice handling and conditions of storage while on board the fishing vessel.

The fisherman should discard any fish that is diseased or is known to contain harmful substances or has undergone deterioration or any process of decomposition or which has been contaminated with foreign matter to an extent which has made it unfit for human consumption.

Guidelines for Handling Fresh Fish at Sea

Vessel Design and Construction

Vessels used for fresh fish fishing should be designed and kept in such a way to permit ease of cleaning and disinfecting, rapid and efficient handling of fresh fish and constructed as to minimize damage or contamination of catch.

Fisherman's earnings are determined not by the quality of fish caught but by the quantity of the catch sold to the processor. With this in mind, fishing vessels should be designed and constructed as not to cause contamination of fish with bilge water, sewage, smoke, fuel, oil or other objectionable substances.

For older vessels the fishermen should take all precautions (including the use of a clean container to store fish) not to cause contamination of fish with bilge water, sewage, smoke, fuel, oil or other objectionable substances.

The deck or working area should be clear of obstacles and other interference to facilitate easy movement and proper sorting of catch. Species which might contain ciguatera toxin should be returned to the sea.

All surfaces which fish might come in contact with should be of suitable corrosion-resistant material, which is smooth and easily cleanable. If wood is used it should be treated to prevent the entry of moisture and should be coated with a durable marine non-toxic paint or other non-toxic surface coating that is smooth and readily cleanable.

Cigua toxin is the bio-toxin that is of significance in the Northern Caribbean.
It is the disease which occurs as a result of ciguatera poisoning common among the species in tropical and sub-tropical seas. The source of the toxin is a dinoflagellate and over 400 species of sub tropical and tropical fish have been implicated. There is no valid non destructive method of detection and, therefore, knowledge of the harvest area and the fishery is extremely important in avoiding the disease.

Hygienic Facilities

Areas on deck where fish are unloaded and handled, or the hold where fish are stowed should be well defined, readily cleanable and should be kept clean.

Storage of fuel and other petroleum products or of cleaning or disinfecting agents should be so arranged that there is no possibility of contaminating the contact surfaces of fish. Any exposure, even for a short time, very often results in objectionable taste and odors, which are difficult to remove. Such fish should therefore be discarded.

Clean sea water should be used at all time. Sea water should not be used while the vessel is in the harbour or

areas where there is a danger of it being polluted, including areas where toilet waste and engine cooling water is discharged.

If bait is carried, separate containers should be set aside for bait storage and held well away from the catch (to avoid contamination).

Fishing vessels should be equipped with brushes, scrapers and other suitable washing and disinfecting equipment. Brushes should be kept clean, disinfected after each use and when not in use stored in a dry state (wet storage conditions aid the proliferation of micro-organisms).

If poisonous and harmful materials, including pesticides, cleaning and disinfecting agents, are stored on board the vessel, they should be kept in separate compartment, reserved and marked specifically for this purpose.

Hygienic Operating Requirements

All containers used in the handling and storage of fish, including ice boxes, baskets, crates, open weave bags should be thoroughly cleaned, sanitized and rinsed after each cycle of operation.

Before any fish comes aboard, and between each haul of pots/traps/line, deck and all other deck equipment that will come in contact with the catch should be washed down with clean sea water and brushed to remove all visible filths and debris.

During fishing trips the bilge sump should be drained regularly (bilge water containing fish debris and blood serve as a good medium for the multiplication of micro-organisms). Bilge sump should be cleaned and disinfected regularly.

Water used for cooling engines should not be used for washing decks, holds or any surface that might come in contact with fish (this water may be contaminated with oil or other petroleum products).

When cleaning operations are carried out while the vessel is in port, only potable water or clean sea water should be used. After the catch is unloaded, the deck and all other deck equipment should be hosed down, brushed, thoroughly cleaned with a suitable cleaning agent, disinfected and rinsed. **Harbour water is usually heavily polluted and should never be used for cleaning.**

Effective measures should be taken to protect the fishing vessel against insects, rodents, birds or other vermin (these are potential carriers of many diseases, which may contaminate the catch). Vessels should be regularly inspected for signs of infestation.

Dogs, cats and other animals should be excluded from areas of the vessel where fish are hauled or stored (to prevent contamination of catch).

Handling the Catch on Board

Fish should be kept alive and in good condition. They should not be dropped, thrown, or roughly poured from the traps/pots/line. Rough and careless handling can result in damaged, which will district tissue to easily decompose. When fish are moved they should be carefully picked up and immediately placed into proper receptacle, where fish are covered with ice or into chilled seawater with ice. It keeps fish from being contaminated or damaged and fresh.

Fish should not be exposed to wind, rain, high temperatures or toxic substance. Exposure to strong sunlight will cause rapid drying and high temperature, which cause micro-organisms growth and auto-decomposition.

Line caught fish should, wherever practicable, be stunned as soon as they are taken on board the vessel.

If fish are allowed to struggle and thrash about on deck, they may not only be badly bruised, but may become exhausted before they die, and their quality impaired. It is of course recognized that the stunning of small fish is impracticable.

Stunning should be done only on the head and, with some fish, preferably while the fish is still in water. Fish should be landed by hooking under the gills rather than gaffing in the body or lifting by the tail. With heavy fish the spine might break when the fish is lifted by its tail thus resulting in local flesh discoloration and muscle separation.

When the fish are to be bled, this should be done immediately after the fish are landed on deck. Gutting should commence as soon as the catch comes on deck

The reason for prompt gutting are, firstly, to sever some of the main blood vessels allow the fish to bleed and, secondly, to remove the stomach and gut which would otherwise cause a softening of the flesh and accelerate spoilage. Fish in which the guts are full of food will spoil even more rapidly. Although immediate gutting is desirable with most species, the catch in certain fisheries cannot be handled rapidly enough, and advantages gained by gutting, may be offset by quality loss resulting from rises in fish temperature. In such circumstances it would be preferable to get the fish under cover and to chill quickly, rather than delay the chilling operation by gutting.

Where rapid gutting is not practicable whole fish should be washed and chilled as soon as it comes on deck.

Gutting should be complete and carried out with care. Bad gutting might be worse than no gutting at all.

Fish guts should not be allowed to contaminate other fish on deck.

Immediately after gutting fish should be washed with clean sea water or potable water.

On completion of washing the fish, further handling should be carried out without delay.

Fish should be chilled rapidly on melting ice and should be stored so that the temperature does not rise. For short term storage, however refrigerated sea water or refrigerated brine may be used.

It's well known that temperature is the most important single factor influencing the keeping quality of fish. It is, therefore, most important to chill quickly the fish to the temperature of melting ice soon after capture, and maintain it in a chilled condition until it reaches the consumer.

Fish should be surrounded by adequate quantities of ice.

Ice should also be used to prevent contact with all surfaces in the fish hold.

Where boxed stowage is used, the fish should be properly iced and the boxes not overfilled.

The packing of fish with ice, into containers at sea, in same areas, offers a number of advantages of certain fisheries. When properly iced, the fish can remain undisturbed in the containers until they reach the processor. Unloading the catch can become a simple operation, and more ice can be added to the containers on landing, without disturbing the fish.

Generally, properly boxed iced fish should be of a higher quality than fish caught the same day and stored in other ways. Each day's catch can also be separated more easily. Since boxes are stacked one on top of another in the fish hold, overfilling with ice or fish will result in crushing and damage to the fish. For efficient cooling, each box should contain a layer of ice on the bottom, then, some fish and ice mixed together, and lastly a top layer of ice. Boxing should not be mixed with other methods of stowage during the same trip.

A stowage plan should be kept on any vessel fishing for more than a day or two.

A well prepared stowage plan enables the various days' catches to be kept separately when unloading. Fish from different day's catches should never be stored mixed together**.**

Gridline for unloading the Catch

Unloading will be monitored by Fisheries Officers or Plant Supervisor.

Unloading of the catch

Unloading the catch should be carried out in a carful manner without delay

In most fisheries the catch is landed after being separated from the ice in the fishroom. Any undue delay at this stage allows the fish temperature to rise, thus increasing the rate of spoilage. For this reason, the landing of boxed iced fish is to be recommended.

At the conclusion of each fishing trip, all unused ice should be discarded before cleaning begins.

Ice left in the fishroom, even if it has not been used on the previous trip, may be contaminated with fish spillage micro-organisms. If this ice is used on any subsequent trips, for cooling fish, may accelerate spillage of the catch.

Mixing of different day's catches during unloading should be avoided.

Batches of fish, of mixed quality, should fetch a lower price on the market. Poorer quality fish will soon contaminate any of higher quality if they are mixed together. A good stowage plan, showing the position of each day's catch in the hold may avoid mixing.

Fish should not be damaged during unloading.

Care should be taken that fish are not damaged or contaminated during sorting, weighing and transferee to containers.

Physical damage can increase spillage rate and badly torn fish are useless for processing purposes.

Transport of the Catch

Trucks used to transport fish in ice box should be kept refrigerated to keep fish child to temperature 0.0-3.0℃. Transport time to processing plant should be kept to a minimum

Guideline for Handling of Fresh Fish on Shore Plant Facilities and Operating Requirements

Plant Construction and Layout

General Consideration

Fresh fish processing plants should be specifically designed for the purpose.

Plant Construction and Sanitary Design

The plant and surrounding area should be such as can be kept reasonably free from objectionable orders, smoke, dust or other contamination. The building should be sufficient in size without crowding of equipment or personnel. Well constructed and kept in good repair. They should be of such design and construction as to protect against the entrance and harboring of insects, birds or other vermin and to permit ready and adequate cleaning.

Floor should be hard surfaced, non-absorbent and adequately drained.

Drains should be of an adequate size, suitable type, equipped with traps and with removable gratings to permit cleaning.

Internal walls should be smooth, waterproof, resistant to frustrate, light colored and readily cleanable.

Window sills should be kept to a minimum side, be sloped inward at 45°and be at least 1 meter from the floor.

All doors through which fish or their products are moved should be sufficiently wide, well constructed of a suitable material and should be of a self-closing type.

Ceilings should be designed and constructed to prevent accumulation of dirt and condensation and should be easy to clean.

Premises should be ventilated to prevent excessive heat, condensation and contamination with obnoxious odors, dust, vapor or smoke.

A minimum illumination of 22 LUX (20 foot candles) in general working areas and not less than 540 LUX (50 foot candles) at points requiring close examination of the product should be provided and should not alter colors. Light bulbs and fixtures suspended over the working areas where fish is handled in any step of preparation, should be of the safety type or otherwise protected to prevent food contamination in case of breakage.

Sanitary Facilities

Areas where fish are received or stored should be so separated from areas in which final product preparation or packing is conducted as to prevent contamination of the finished product.

A separate refuse room or other equally adequate offal storage facilities should be provided on the premises.

Any by-product plant should be entirely separate from the plant which is processing fresh fish for human consumption. The layout and construction of a plant processing fish for human consumption should be such as to ensure that the areas in which fish for human consumption are held, processed and stored are used for that purpose only.

When implant chlorination of water is used the residual content of free chlorine should be maintained at no more than the minimum effective level for the use intended. Chlorine system should not be relied upon to solve all sanitation problems. The indiscriminate use of chlorine cannot compensate for unsanitary conditions in a processing plant.

Ice should be made from potable water or clean sea water and should be manufactured, handled and stored so as to protect it from contamination.

Identified by contrasting colors and labeled and with no cross-contaminations or back-siphonage with the lines carrying potable water.

Proper facilities for washing and disinfection of equipment should be provided. Facilities should be present in every fresh fish processing establishment for cleaning and disinfection of trays, removable cutting or filleting boards, containers and other similar equipment and working implements. **Such facilities should be located in a separate room** or in designated areas in the work rooms where there is an adequate supply of hot and cold potable water or clean sea water, under good pressure, and where there is proper drainage. **Any containers and equipment used for offal or contaminated materials should not be washed in the same area.**

Equipment and Utensils

All work surfaces and all containers, trays, tanks or other equipment used for processing fish should be of smooth, impervious, non-toxic material which is corrosion-resistant and should be designed and constructed to prevent hygienic hazards and permit easy and thorough cleaning. In general the use of wood for this purpose is not recommended.

Market containers for repeated use should be made of suitable corrosion-resistant material and should be constructed so that they can be easily cleaned.

Containers should be large enough to hold adequate quantities of ice as well as the correct weight of fish. They should be strong enough to withstand fairly rough handling and be suitable for stacking when filled, without damage to fish in boxes below. Drainage should also be arranged to avoid contamination of fish in stacked boxes.

Returnable boxes should be of suitable corrosion-resistant material.

Non-returnable boxes should be strongly constructed and durable enough for any normal handling operation during distribution. They should be large enough to hold an adequate amount of ice as well as the required weight of fish. Provision should be made for the drainage of melt-water. Where wood is used it should be clean and new.

Filleting boards and other surfaces on which fish are cut should be made of impervious materials which meet the physical requirements for cutting surfaces.

Processing line should be designed as a continuous processing unit with all operation arranges sequentially in such a way that the fish could move uniformly fast through the line without any stoppages or slow-downs.

The use of machines for scaling, gutting, washing or filleting and similar operations, which are properly designed, is to be encouraged.

Equipment used for dipping or spraying fish should be made of impervious corrosion-resistant material and should be easy to clean dip tanks should be emptied, thoroughly cleaned and disinfected between each cycle of use.

Fresh fish transport vehicle should be designed to allow adequate icing of fish to protect fish from warming up during transport, and should be of such material and construction as to permit easy and through cleaning.

Hygienic Operation Requirement

General sanitation in an establishment where fresh fish is processed for human consumption should be of the highest standard present in any food processing industry.

The building, equipment, utensils and other physical facilities of the plant should be kept clean, in good repair and should be maintained in an orderly and hygienic condition.

Filleting cutting boards should be frequently and thoroughly scrubbed and treated with disinfectant. Wherever practicable the boards should be continuously flushed with running potable or clean sea water during use. The flushing water should contain 4 ppm of residual chlorine.

If barrels or other containers are used on the filleting line for the collection and disposal of offal, they should be located below the level at which the fish are processed and in such a way that there is no splash-back on the processing line.

All machines used for scaling, gutting, washing, filleting or similar operations should be thoroughly cleaned, disinfected and rinsed during rest of meal breaks and before resumption of production following other work stoppages.

All machinery and equipment should be inspected before processing begins to ensure that it has been properly cleaned, disinfected, rinsed and reassembled.

All trapped or accumulated product in machinery and equipment should be removed periodically throughout the working day.

All handling and processing operation involved in the preparation and distribution of fillets and similar products should be carried out under hygienic conditions.

Market containers and all returnable fish boxes should be thoroughly cleaned and treated with disinfectant immediately after each use.

Only new and clean boxes, cartons and wrapping material should be used for the transport and distribution of fresh fish, fillet and similar products where returnable boxes are used they should be of corrosion-resistant material and thoroughly cleaned and disinfected after each use.

All wharves, quays, markets and similar area where fish are unloaded or displayed for sale, should be kept clean and disinfected.

Removal of solid, semi-solid or liquid wastes from fish unloading, holding and processing areas should be on a continuous or near continuous basis using water and/or appropriate equipment so that these areas are kept clean and there is no danger of contaminating the products.

Effective measure should be taken to protect against the entrance into the premises and the harborage on the premises of insects, rodents, birds or other vermin.

Dogs, cats and other animals should be excluded from areas where fish is received, handled, processed or stored.

All persons working in a fresh fish plant should maintain a high degree of personal cleanliness while on duty and should take all necessary precautions to prevent the contamination of the fish or their products

or ingredients with any foreign substance.

No person who is known to b suffering from, or who is a carrier of any communicable disease or has an infected wound or open lesion should be engaged in the preparation, handling or transporting of fish or fish products.

Conveyances used for transporting fish should be cleaned and disinfected immediately after each use and should be so maintained as not to constitute a source of contamination for the products.

Operating Practice and Production Requirements

General Considerations:

Fresh fish should be handled, processed and distributed with care and a minimum delay

Adequate facilities should be available, at the processing plant, to maintain fish in a chilled condition.

No fish should be offered for sale or used for further processing which has undergone deterioration or any process of decomposition or which has been contaminated with foreign matter to an extent which has made it unfit for human consumption.

Handling of Whole and Gutted Fish

Fish should not be displayed or left lying about markets or auction halls any longer than necessary to meet inspection requirements and sale.

Finely divided ice should be well dispersed among the fish when filling market containers.

Fish offered for sale on the market should be graded and sorted so that all fish in a container are of similar species, size and quality.

Walking on or kicking fish and waking over boxes in the market should be discouraged.

Inspection procedures should not involve delaying the sale of the catch.

Boxes should not be emptied out on the market floor for examination.

Fish should be removed from the market immediately after the sale.

Fish should at all times be kept chilled and moved through the processing chain quickly.

Some whole fish may require gutting on arrival at the processing plant. This operation should be carried out efficiently and with care.

Immediately after gutting and before packing, all fish should be thoroughly washed using cool potable water or cool clean sea water. The fish should not be exposed to any warming effects of the weather for long periods. After washing, the fish should be drained properly.

Fish should be thoroughly prechilled before being packed for shipment.

Adequate quantities of finely divided ice should be used in packing fish for transport. The ice should be well dispersed amongst the fish and should also surround it in sufficient amounts to keep it out of contact with the container surfaces during the journey.

For transport to the various outlets, boxes of iced fish should be loaded in insulated vans and should be stacked close together, to present as little surface as possible for heat absorption. A layer of ice below and on top of the stack of boxes for additional cooling is of further benefit. If possible the vehicle container should be pre-cooled before loading starts.

Where fish is transported in vehicles having mechanically refrigerated containers, cold air should be circulated completely round the load. The temperatures should be maintained slightly above the melting point of ice, so that some ice melt-water is always cooling the fish, and to avoid partial freezing of the outer layers of fish.

Handling of Filets and Similar Products

Fish which cannot be processed immediately on arrival at the factory should be well iced in clean containers and stored in specially designated areas within the plant, where they will be protected from heat and weather conditions, and will not be contaminated by dust, insects or vermin. **Where possible the iced fish should be stored in a chill room, the temperature of which is just above that of melting ice.**

All fish should be carefully sorted before they are filleted or processed in a similar manner any damaged, contaminated or otherwise unacceptable fish should be discarded.

All fish should be thoroughly washed before being placed on the filleting and cutting tables. Some species may require scaling and should be washed after this operation.

All filleters should be trained and required to use filleting techniques in which contact between the cut surfaces of the fillet and the filleting board is minimized.

With non-mechanized filleting lines the supply of raw fish to the line should be regulated so that each fish could be processed with the minimum of delay.

After cutting, the fillets or similar products should be placed directly on clean conveyors or into clean containers. Piling large quantities in one container should be avoided.

Fillets and similar products should be packed for transport so that there is no direct contact with ice or melt-water. Wet-strength paper or plastic films should be used to wrap the products and separate them from ice used in packing.

Packaging material should be sufficiently strong and durable to withstand stresses during processing, handling, storage and distribution.

Packaging materials should be clean and stored in a hygienic manner. Packaging should be carried out under conditions that prevent contamination of the product.

If possible **the prepackaging should also be done by the fresh fish processing plan**t rather than by a distributor or retailer.

Boxes for fillets and similar products should be handled very carefully during transport and distribution. They should never be up-ended.

Sanitary Control Program

It is important that the fish processing plant in its own interest designates a single individual whose duties are preferably divorced from production, to be held responsible for the cleanliness of the establishment.

Laboratory Control

In addition to any control by the official agency having jurisdiction, it is desirable that each fish processing plan in its own interest should have access to laboratory control to establish hygienic quality of the product processed.

End Product Specification

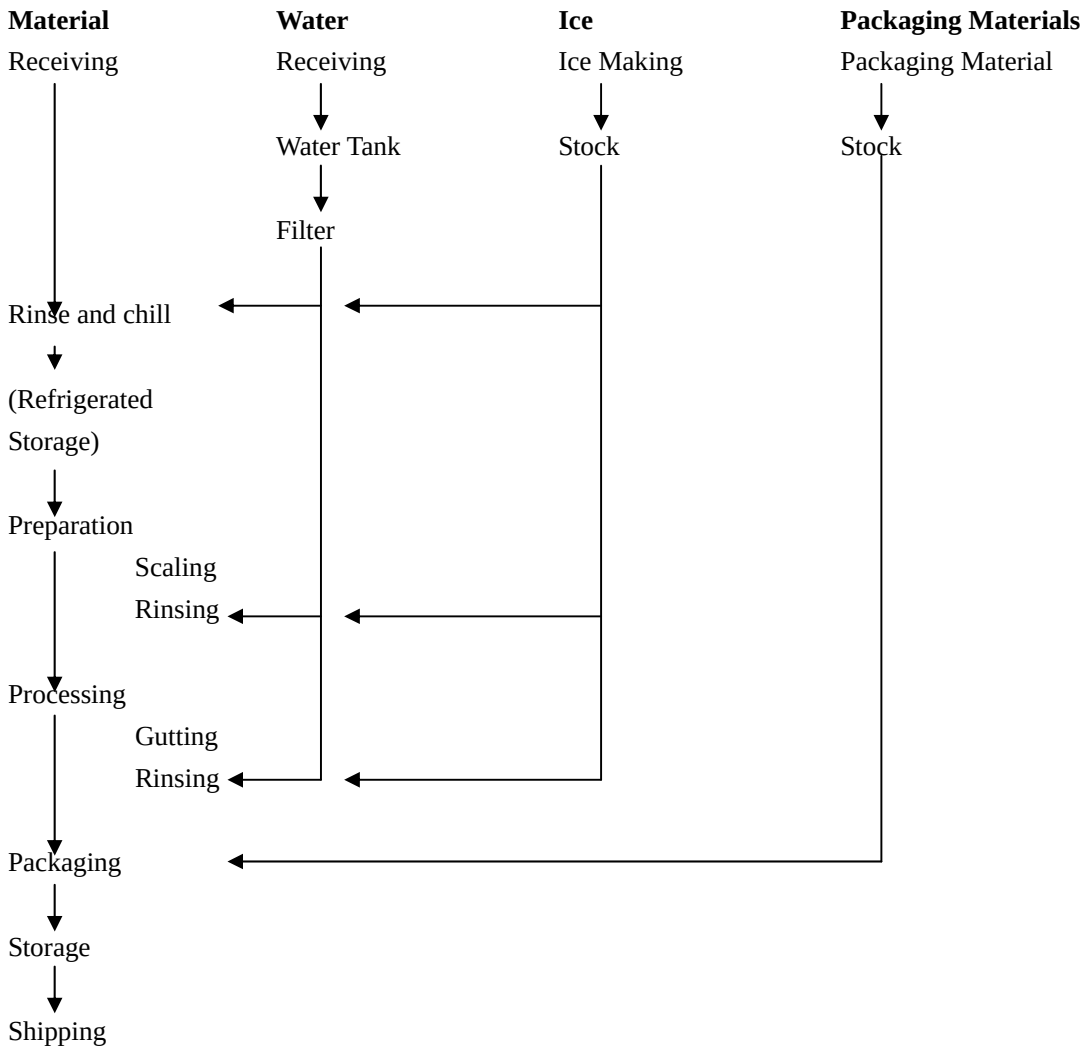
Appropriate methods should be used for sampling and examination to determine compliance with the following specifications:

a) Fishery products should be, to the extent possible in good manufacturing practice, free from objectionable matter and parasites.
b) Fishery products should be free from micro-organisms in amounts harmful to man, free from parasites harmful to man and should not contain any toxic substances originating from micro organisms in amounts which may represent a hazard to health
c) Fishery products should be free from chemical contaminants in amounts which may represent a hazard to health.
d) Fishery products should comply with any requirements set forth by the Codex Alimentarius Commission on pesticide residues and food additives as contained in permitted lists of Codex commodity standards, or should comply with the requirements on pesticide residues and food additives of the country in which the fish will be sold.
e) Specifications A, B, C ad D should, to the extent possible, also apply to fresh fish.

Product Description

PRODUCT DESCRIPTION- FRESH FISH	
Characteristics	Description
Product Name	Fresh Fish Snapper and Mix Fish
Aquatic raw material	Snapper, Red Hind, Grant, Parrot fish, Dr Fish (Surgeon fish)
How is raw material received	Via refrigerated boat or in ice. Refrigerated product must be less than 3℃ or less. Fish is processed within 24 hours of receiving. During storage, the internal temperature of the fish must be 1.5℃.
Harvest area	Local offshore islands
Finished product description	Refrigerated product
Other ingredients	ice and water
Processing steps	rinsing, scaling, gutting, rinsing packaging, shipping
Packaging types	in Styrofoam trays or ice boxes covered with ice
Storage requirements	packaged product will be refrigerated at 4.4℃ or less; must have an internal temperature of <3℃ within 6hr.
Distribution conditions	less than or equal to 4.4℃
Shelf Life	10 days
Labeling requirement	must provide weight, species, shelf life, temperature requirements, lot's number and must state that this is a fresh product
Special conditions/properties	Must be refrigerated during transport
Intended use	Cook-to-eat (ready for cooking)
Intended customers	Exporters and Domestic retail for local consumption
Applicable regulations	All ingredients must be food grade

Fresh Fish Processing Flow Chart I



Fresh Fish Processing Flow Chart II

Material		
Receiving	Fresh fish delivered on ice	On board cond. Checking (CCP1)
	Weight determination/verification	
	Quality determination	Fish temp. checking and Sensory Evaluation (QC & CCP2)
		Species identification (CCP3)
Rinse and chill	Washing chilled water	
	Ice storage	
(Refrigerated Storage)		Checking Temperature (CCP4)
Preparation	Rinsing in chilled water	
	Scaling	
	Rinsing (chilled water 10-16℃)	
Processing	Gutting and defining	
	Washing chilled water (<10℃)	
	(Filleting, Staking, Pan dressing)	
	Chilling	Sensory Evaluation (QC)
	Rinsing (chilled water 3-7℃)	
	Draining	
Packaging	Tray packaging/ vacuum packaging/ bag packaging	
Storage	Ice Storage	
	Refrigerated Storage/ Super Chilling (0-4℃)	Checking Temperature (CPP5)
Shipping		Checking Time and Temperature (CPP6)

Receiving Standard Procedure

The fish should be treated in accordance of the "Guidelines for Handling Fresh Fish at Sea" of this SSOP.

At the receiving level, **the boxed stowage conditions** should be checked by Plant Supervisor and/or Quality Control Officer and recorded into the "Daily Record for Receiving Material (Fish) at Processing Plant of Point Wharf Fisheries Complex". The box and fish should be checked for signs of contamination (oil, fuel or other objectionable substances), mutilation and damaged. Acceptable **(CCP1)**

Fish should be surrounded by adequate quantities of ice. **The internal temperature of the fish** sampled should be checked by Plant Supervisor and/or Quality Control Officer and recorded into the "Daily Record for Receiving Material (Fish) at Processing Plant of Point Wharf Fisheries Complex." If the temperature is exceeded 3℃, the sensory evaluation value must be Extra level. The fish sensory evaluation level A or B or C will be discarded. **(CCP2)**

The sensory evaluation of fish should be conducted by Plant Supervisor and/or Quality Control Officer and recorded into the "Daily Record for Receiving Material (Fish) at Processing Plant of Point Wharf Fisheries Complex." For export the sensory evaluation Extra level is acceptable. If the fish sensory evaluation value is A, the fish will be for the local market If the B or C, the fish will be discarded. **(CCP3)**

"Daily Record for Receiving Material (Fish) at Processing Plant of Point Wharf Fisheries Complex" should be kept on file for at least one year.

Weighing and Temperature measuring Standard Procedure

All processors are required to have their weighing instruments and thermometer verified by the inspector of Weights and Measure at least once every quarter. The results of verification should be filed for at least a year.

The Inspector of Weights and Measures is required by law to make a surprise visit al least once in every quarter. The results of the surprise visit should be filed for one year.

Only weighting and thermometer that have been verified by the Inspector of Weights and Measures should be used for processing. The record should be kept on file at least one year.

For internal verification of thermometers, the ice water as 0.0 ℃and the boiling water as 100.0℃ should be used for reference and the thermometer should be tested monthly. The test result should be recorded into "Monthly Test for Thermometer."

Packaging Standard Procedures

Packaging material used in processing must be approved by Manager of Point Wharf Processing Unit. Material should be clean and stored in a hygienic manner as to prevent contamination. Purchasing receipts for packaging material should be kept on file for at least a year.

Rooms where packaging materials are stored must be constructed in such a way as to protect against the entrance and harboring of rodents, insects or other vermin. Rooms should be designed to permit ready cleaning. Rooms should be used solely for the storage of packaging materials.

Packaging material must not be reused.

Purchasing receipts and "Daily Record for Receiving Packaging Material and others at Processing Plant of Point Wharf Fisheries Complex" for packaging material should be kept on file for one year.

Labeling Standard Procedure

At a minimum individual box (or the master container if used) should be labeled with the following:

1	Name and complete address of processor (include country of origin, telephone or fax #)
2	Approval number
3	Lot identification #
4	The proper species identification
5	The net weight
6	Date of packaging
7	A warning stating "HANDLE WITH CARE FRESH FISH"
8	A statement to keep product chilled (0℃ to 3 ℃)

Labels must be of adequate size, legibly printed and conspicuously visible.

Distribution Standard Procedure

Once packed fish should be handled with care and distributed with minimal delay. Distribution Schedule should therefore be designed for most rapid transit possible with the shortest possible exposure to high temperature or direct sun light.

If possible, refrigerated trucks or vessel should be used to transport containers. If this is not possible containers should be transported in a sheltered environment with proper insulation at the base to prevent the transfer of heat from the engine, air or sunlight. Again delivery of the containers should be scheduled to minimize delay.

Prior to the start of operations all vehicles or vessel used for transport should be thoroughly cleaned.

Records pertaining to distribution "Temperature Control Record during Shipping" should be kept on file for at least a year.

Upon arrival at the destination, the ice must not be melted and fish must be covered with ice.

If the fish temperature exceed 3 °C and lower than 4.4°C, fish should be done sensory evaluation using "Sensory Evaluation Seat for the Receiving of Fresh Fish." If the level is low as B or C, the fish must be discarded. And the record must be sent to the Processing Plant.

If the fish internal temperature is exceed more than 4.4°C, the lot must be discarded.

Manager of Processing Plant must inform to Chief Fisheries Officer immediately. The record must kept on file at least one year.

Records Standard Procedures

Attached in Appendix A are some of the relevant records that should be kept with regards to the Inspection Program for Fresh Fish. At minimum processors' records should be consistent in structure to the facsimiles of the following records included in Appendix:

- SSOP LOG LIST
- SSOP LOG LIST
- SSOP LOG LIST
- SSOP LOG LIST
- SSOP LOG LIST
- SSOP LOG LIST

Except for the current day's records, all records pertaining to the Inspection Program should be kept and maintained in the owner's or manager's office. Records should be filed separately by record type (i.e. Daily Record for Receiving Material should be in a separate file from the Distribution Log). **All records must be filed for at least one year after the date they are prepared, after which they may be disposed.** In addition the following type of records should also have a separate file and maintained for at least a year:

① Records pertaining to the weighting instrument and thermometer calibration or repairs.
② Report of each internal periodic verification
③ Purchasing receipts for packaging material
④ Medical certificates
⑤ Records pertaining to employee training

Processing and other information must be entered on the records, in pen, a t the time that it is observed. To make corrections, place a line through the error and initial it. The use of correction fluid ("white-out") is prohibited.

All records must be available for review upon request by the Chief Fisheries Officer, the Chief Health Inspector and other authorized personnel or agency.

Verification Standard Procedures

Daily Verification

All daily records should be turned in at the end of the day to the owner/manager, who is responsible for reviewing and authenticating the information by signature or initials.

Owner/manager or designated representative should make daily checks with respect to the steps in processing, documentation of records and following of corrective action plan.

Periodic Verification

Once processors are validated by the Chief Fisheries Officer, processors will be audited by the Chief Fisheries Officer and the Chief Health Inspector (or their designated representatives) at least once per month for the first six months and once every four months thereafter.

Internal Verification should be made by the processors every six months and following every systems failure. A report should be generated recording the highlights of the Internal Verification. A Systems Audit Checklist (available at Fisheries Division) may be used for Internal verification.

Reports of the Internal Verification should be kept on file for at least a year.

Prior to any change or modification I processing, the Chief Fisheries Officer must be notified in writing for approval.

Consumer Complaint Standard Procedures

Complaints should be addressed to the owner/manager or a representative appointed by owner/manager, who should gather all the required information and complete the necessary sections of the Consumer Complaint Report.

The owner/manager or representative should investigate the complaint and take the necessary action to resolve the situation (nothing any action taken on the Consumer Complaint Report).

Consumer Complaints should be reviewed weekly by the owner/manager and used to improve processing wherever applicable.

Prior to any change or modification in processing, the Chief Fisheries Officer must be notified in writing for approval.

Report dealing with consumer complaints should have a separate file and maintained for at least a year.

Recall Standard Procedures

A recall should be issued by the processor for any product that the processor or the Chief Fisheries Officer or the Chief Health Inspector, deem to be in violation of the law, to protect the public from risk of injury or gross deception.

At a minimum the following the information should be provided to consignees, the Chief Fisheries Officer and the Chief Health Inspector:

1) Product description
2) Lot or Batch Identification #
3) Shipping Information
4) Reason for recall
5) Instruction to the consignee on how to handle the recalled product.

In the event of a recall, processor should:

1) Identify all affected lot(s).
2) Notify the Chief Fisheries Officer, the Chief Health Inspector and the regulatory agency in the importing country by the most expedient method (FAX or telephone).
3) Notify the consignees of the nature of the recall by FAX or telephone.

APPENDIX

This appendix contains a list of records (including a sampling plan) that should be maintained with regards to the Inspection Program for Fresh Fish. Facsimiles of the following records included

SSOP LOG LIST
SSOP LOG LIST
SSOP LOG LIST
SSOP LOG LIST

No.01 Daily Sanitation Control Record

Date **Supervisor** **Manager**

Sanitation Area	**Pre Operation Time 0800**	**Start Time 0830 hrs.**	**Luncheon Break**	**Post Operation 1600 hrs.**	**Concentration of Sanitizer**	**Remark**
Table Tops	S	S	S	S	S	
Table shelf	S	S	S	S	S	
Bins	U	S	S	S	S	
Knives						
Scales						
Cleaning Bins						
Storage trays						
Buckets						
Floor						
Drain cover						
Drain						
Drain basket						
Shovels and Scoop						
Cooler Racks						
Air curtain						
Foot bath						
Hand dryer						
Plastic Wrapper						
Fish Slicer						
Conveyor table						
Chiller Door and handle						
Blast Freezer door						
Walls						
Switches						

S-Satisfactory U-Unsatisfactory Note: This record should be checked daily by PS and be reviewed by MA.

No.02 Daily Sanitation Control Welfare Facilities for Lavatory, Staff changing rooms and entrance area

Date **Supervisor** **Manager**

Lavatory						
Time of Check		**Cleanliness of Area (1) P/F**	**Facilities functioning status (2)**	**Facilities adequately supplies (3)**	**Comments/ Corrections**	**Checked by**
0800		P	P	P		
1200		P	P	P		
1600		P	P	F	Lack of toilet paper, re-supply of toilet paper	
Staff Changing Area						
Time of Check		**Cleanliness of Area (1) P/F**	**Facilities functioning status (2)**	**Facilities adequately supplies (3)**	**Comments/ Corrections**	**Checked by**
0800						
1200						
1600						
Entrance area						
Time of Check		**Cleanliness of Area (1) P/F**	**Facilities functioning status (2)**	**Facilities adequately supplies (3)**	**Comments/ Corrections**	**Checked by**
0800						
1200						
1600						

F-Fail P-Pass

(1) Cleanliness of sinks floors dust bins etc.

(2) Hot water available plumbing functioning

(3) Soap toilet paper etc

Note: This record should be checked daily by PS or MA.

No.03 Monthly Sanitation Control Record

Date **Supervisor** **Manager**

Sanitation Area	Status	Comments
Safety of Water Supply Tank	S	-No evidence of sediments in storage tanks -residual chlorine levels are within acceptable level as tested by water authority -no cross connection s in had plumbing
Air-condition Unit 1, 2 and 3.	S	-All Good condition -All a/c units leaned by cloth

S-Satisfactory

U-Unsatisfactory

Note: This record should be checked monthly by MS or MA and be informed to CFO.

No.04 Daily Sanitation Control of Water Quality for Point Whalf Processing Plant

Acceptable chlorine level is 0.05 ppm or more. The level is checked 0800, 1200 and 1600 hrs every operational day.

Date	Time		Chlorine level (ppm)	pH	Remarks	Checked by
	0800					
	1200					
	1600					
	0800					
	1200					
	1600					
	0800					
	1200					
	1600					
	0800					
	1200					
	1600					
	0800					
	1200					
	1600					
	0800					
	1200					
	1600					
	0800					
	1200					
	1600					

No.05 Daily Sanitation Control Record for Water Filter

Date and time	Status	Remarks	Checked by
18 Oct 2007 8;23am	Filter 1 F	The filter 1 was replaced new one.	
19 Oct 2007 9:01am	Filter 1 P		
	Filter 1		
	Filter 1		
	Filter 1		
	Filter 1		
	Filter 1		
	Filter 1		
	Filter 1		
	Filter 1		

No.06 Sensory Evaluation Seat for the Receiving of Fresh Fish

Lot No._____ Fish No._____

	Score	Extra	A	B	C
Skin		Bright shining, iridescent or opalescent, no bleaching	Waxy, slight loss of bloom, very slight bleaching	Dull, some bleaching	Dull, gritty marked bleaching and shrinkage
Outer slime		Transparent or water white	Milky	Yellowish grey, some clotting	Yellow brown, very clotted and thick
Eyes		Convex black pupil, translucent cornea	Plane, slightly, opaque pupil, slightly opalescent cornea	Slightly concave, grey pupil, opaque cornea	Completely sunken, grey pupil, opaque discolored cornea
Gills		Bright red mucus, translucent	Pink, mucus slightly opaque	Grey, bleached, mucus opaque and thick	Brown, bleached, mucus yellowish grey and clotted
Peritoneum		Glossy, brilliant, difficult to tear from flesh	Slightly dull, difficult to tear from flesh	Gritty , fairly easy to tear from flesh	Gritty, easily torn from flesh
Gull and internal odours		Fresh, strong, sea weedy, shellfishy	No odour, neutral odour, trace of musty, mousy etc.	Definite musty mousy tec., bready, malty etc.	Acetic, fruity amines, sulphide, fecal
Overall score _____, Date_____ Time _____, Checked by _____					

Note' Only the EXTRA or A quality of fish will be received by the Fish Processing Plant of the Point Wharf Fisheries Complex.

No.07 Sensory Evaluation Seat for the Fillet and similar product

Lot No._____ Date_____ Time _____Checked by_____

In case the fish are processed as fillet or similar fresh fish product the evaluation must be done.

Product	**Appearance**	**Texture**	**Odour**	**Flavor**
Fillets raw				
Fillets cooked				

S-Satisfactory

U-Unsatisfactory

Sensory evaluation for fillets cooked should be done following procedure:

a) wrapping a fillet from the sample in a single layer of aluminum foil
b) steaming over a water bath and steaming for 10 minutes on each side
c) evaluation of appearance (where applicable) texture odour and flavor in accordance of the "Criterion for Assessment of Quality by Sensory Evaluation for Chilled Fillet (bony fish)"
a) Sampling for fillets cooked should be followed by "Sampling plan and Rejection Numbers for the inspection of Fish"

No.08 Temperature Control Record for the Cold Storage Room (CCP4 and CCP5)

Optimum temperature: Chilled room 1-3 ℃ Freezer -20 or less

Date	Time		Chilled Room	Freezer	Checked by
	0800				
	1200				
	1600				
	0800				
	1200				
	1600				
	0800				
	1200				
	1600				
	0800				
	1200				
	1600				
	0800				
	1200				
	1600				
	0800				
	1200				
	1600				
	0800				
	1200				
	1600				
	0800				
	1200				
	1600				
	0800				
	1200				
	1600				

No.09 Temperature and Humidity Record for Processing Rooms

Date	Time		Receiving Room		Processing Room		Packaging Room		Checked by
			℃	%	℃	%	℃	%	
	0800								
	1200								
	1600								
	0800								
	1200								
	1600								
	0800								
	1200								
	1600								
	0800								
	1200								
	1600								
	0800								
	1200								
	1600								
	0800								
	1200								
	1600								
	0800								
	1200								
	1600								
	0800								
	1200								
	1600								
	0800								
	1200								
	1600								

No.10 Daily Temperature Control Record for Processing Line QC

Batch No.	Time in	Temp.	Time out	Temp.

No.11 Temperature Control Record during Shipping CCP6

Batch No.	Time in	Temp.	Time out	Temp.

No.12 Employees Training Record

All employees involves in the processing of fresh fish should be familiar with the relevant sections of this manual that pertain to their duties. It is responsibility of the processor, Manager of Point Wharf Processing Unit, to ensure that employees are properly trained and the requirements outlined in this manual are met.

Name of Employees_____ Date in_____

Date	Training Course	Hours	Instructor	Remarks

No.13 Provider or Fisherman Training Record

All provider, include fishermen, involves in the processing of fresh fish should be familiar with the relevant sections of this manual that pertain to their duties. It is responsibilities of the processor, Manager of Point Wharf Processing Unit, to ensure that employees are properly trained and the requirements outlined in this manual are met.

Name of Provider_____Date in _____

Date	Training Course	Remarks

No.14 Monthly Record for Calibration of Thermometer

Date_____ Checked by_____

Thermometer	Ice water temperature	Boiled water temperature
1		
2		
3		
4		
5		
6		

No.15 Fisherman Log

Fisherman fills in:

Date	
Name of fisherman	
Name and Registration # of Vessel	
Species Identification	
Weight of the lot of the fish	
Price paid for lot of the fish	
Date of Harvest	
Location of Harvest site	

Fisherman's signature: _____

Officers fill in:

General Condition of fish

Reason for rejection of product (if applicable)

Date: _____Checked by: _____

No.16 Consumer Complaint Report

Name of Processor: _____

Date of Complaint: _____

Lot Identification #:_____

Specifics of the Complaint:

_____

_____

_____

_____

_____

_____

Action Taken:

_____

_____

_____

_____

_____

_____

Completed by: _____

Date of Review: _____

Signature of Reviewer: _____

Sampling Plan and Rejection Numbers for the inspection of Fish

The sample size, (the number of fish to be inspected is determined by randomly sampling at least 10 fish from the lot to determine the average weight of each fish. Divide the average weight into the estimated or actual weight of the lot to be examined to determine the total number of fish in the lot. Based on the total number of fish the following sampling schedule shall be applied.

No. of Fish in the lot	Sample Size	Rejection Number *
2-15	2	1
16-25	3	1
26-90	5	1
91-150	8	2
151-500	13	2
501-1200	20	3
1201-10000	32	4
10001-35000	50	6
35001-500000	80	8
500000+	125	11

*the minimum number of defective units needed to reject the lot. Once the rejection number has been exceeded, the inspection may be stopped. Please note: this plan does not apply to lots of fish that were hand culled or graded individually.

No.17 Daily Record for Receiving Material (Fish) at Processing Plant of Point Wharf Fisheries Complex

Date_____ Supervisor_____ Manager_____

Time	Providers name	Boat name	Species (CCP3)	Amount Lbs/ Kg	Ice Box Condition (CCP1)	Fishing Ground	Internal Temperature and number of sample (CCP2)	QC sensory evaluation grade (CCP2)	Batch No	Remarks
:							Av 3.0℃ n=3	Extreme n=3		
:										
:										
:										
:										
:										
:										
:										
:										
:										
:										
:										

Remarks;

No.18 Receiving Packaging Material and others at Processing Plant of Point Wharf Fisheries Complex

Date	Product name	Quantity	Provider	Received by	Remarks

No.19 Daily Health Check Record of Plant Workers

Date_____ Supervisor_____ Manager_____

Checking point / Name		1	2	3	4		5	6		7	8
		Condition	Suppuration	Uniform	Cap	hair	Footgear	Nail	Rings, etc	Washing hands	White clothes, cap, boots during using toilet
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

Note: 1, Conform if she or he catching cold, etc. 2, Confirm if there is any suppuration in their fingers. 3, Confirm if the cloths are uniform washed every day and clean. 4 Conform if hair is cleanliness and doesn't come out from the cap. 5. Confirm if they use only the boots provided. 6. Confirm if the nails are cut. 7. Confirm if they wash hand properly (timing and method). 8. Confirm if they don't wear uniforms, cap and boots, which were used in the processing area, into the toilet.

Standard Cleaning Procedure of Plant and Equipment

ITEM	CLEANING		DETERGENT	REMARKS	SANITIZER		RESIDENCE	
	APPROACH	FREQUENCY			TYPE	CONCENTRATION	TIME	REMARKS
Trolleys & Process Table	Routine cleaning	2x/day	Multipurpose	Luncheon Break & end of day	Hypochlorite	50	80 min	
Display Chiller	Routine	Daily/s 3x/day	Multipurpose	Cleaning & Sanitizing of internal and external cabinet area	Hypochlorite	25-50	20 min	Apply rinse after sanitizing
	Periodic	1x/week	Multipurpose	Complete dismantling of equipment	Hypochlorite	25-50	20 min	Do
Chillers	Routine	Weekly	Multipurpose	Walls floor and ceiling	Hypochlorite	25-50	20 min	Rinse after sanitizing allow to air
Knives scalars etc	Routine	Daily 2-3x/day	Multipurpose	Cleaning in a designated area	Hypochlorite	50	30 min	
Cutting Boards, Trays & Boxes	Routine	2x/day	Multipurpose		Hypochlorite	50	30 min	
	Periodic	1x/month	Multipurpose	To remove stains	Hypochlorite			Soak in it hypochlorite solution for 12 hrs
Boots	Routine	1x/day	Multipurpose	Rinse, apply detergent, scrub and rinse	Hypochlorite			
Aprons & Gloves	Routine	2x/day	Multipurpose		Hypochlorite	25-50	30 min	
	Periodic	1x/month	Multipurpose		Hypochlorite	50		Soak in it hypochlorite solution for 12 hrs
Plant Walls & Floor	Routine	2x/day	Multipurpose	Luncheon break and end of the day	Hypochlorite	50		
Ceiling	Periodic	1x/month	Multipurpose	Pressure wash dry clean	Hypochlorite	50-100		
Plumbing Fixtures	Routine	2x/day	Do	Manual cleaning	Hypochlorite	25	20 min	

Sensory Evaluation Guide Line for fresh fish

Only the EXTRA or A quality of fish will be received by the Fish Processing Plant of the Point Wharf Fisheries Complex.

	Extra	**A**	**B**	**C**
Skin	Bright shining, iridescent or opalescent, no bleaching	Waxy, slight loss of bloom, very slight bleaching	Dull, some bleaching	Dull, gritty marked bleaching and shrinkage
Outer slime	Transparent or water white	Milky	Yellowish grey, some clotting	Yellow brown, very clotted and thick
Eyes	Convex black pupil, translucent cornea	Plane, slightly, opaque pupil, slightly opalescent cornea	Slightly concave, grey pupil, opaque cornea	Completely sunken, grey pupil, opaque discolored cornea
Gills	Bright red mucus, translucent	Pink, mucus slightly opaque	Grey, bleached, mucus opaque and thick	Brown, bleached, mucus yellowish grey and clotted
Peritoneum	Glossy, brilliant, difficult to tear from flesh	Slightly dull, difficult to tear from flesh	Gritty , fairly easy to tear from flesh	Gritty, easily torn from flesh
Gull and internal odours	Fresh, strong, sea weedy, shellfishy	No odour, neutral odour, trace of musty, mousy etc.	Definite musty mousy tec., bready, malty etc.	Acetic, fruity amines, sulphide, fecal

Criterion for Assessment of Quality by Sensory Evaluation for Chilled Fillet (bony fish)

Product	Appearance	Texture	Odour	Flavor
Fillets raw	Translucent, glossy natural color opaque, dull, blood stained discolored	Firm, elastic, soft plastic	Marine, fresh, neutral, sour state, spoiled putrid	
Fillets cooked		Succulent, firm, soft, pasty, gelatinous, dry	Marine, fresh neutral, musty, sour, spoiled, taint: absent disinfectant fuel oil chemicals, sulphide	Sweet creamy fresh oil neutral, sour oxidized putrid, musty fermented, rancid, bitter taints: absent disinfectant fuel oil, very bitter alkaline, polyphosphate, chemicals