

THE GROUPER FISHERY OF ANTIGUA AND BARBUDA

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Photo: Fisheries Division, Antigua-Barbuda

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1 INTRODUCTION

Over the past decades, the fishing fleet of Antigua and Barbuda has undergone significant modernisation. Most of the wooden sloops and dories that dominated the sector in the 1970s have been gradually replaced by modern fibreglass launches and pirogues with the latest fishing equipment (global positioning systems, depth sounder, etc). While there have been significant changes in terms of vessel construction and fishing technology, traps or “fish pot” used to target the Caribbean spiny lobster and reef fish remain the dominant gear. Trap-fishing vessels comprised 47% of the 351 active fishing vessels in 2007, followed by gill netters (17%), and hand liners (12%), which fish mainly the snapper (Lutjanidae), grouper (Serranidae) and grunt (Haemulidae) families.

The fisheries sector in Antigua and Barbuda is generally considered to be of little significance to the country’s overall economy; averaging at about 2% of national GDP or 50% of agricultural GDP over the past decade. In recent years however there has been increasing recognition of its potential to the general economy and the role it plays in addressing issues related to balance of trade, food security, employment and poverty alleviation.

In Antigua, the fisheries sector is primarily seen as an “economic safety net” to complement other employment activities in the construction and tourism sectors, especially in the off-season or periods of economic downturn. While in the past the fisheries sector played a major role in the development of many rural communities, the country’s shift to tourism in the 1970s also saw a large-scale shift away from traditional artisanal practices such as fishing and farming. This is particularly true for Antigua, where the tourism sector and government services are the largest employers of the labour force. Barbuda’s economy, in contrast, is still intimately linked to fishing. The spiny lobster fishery on that island offers the highest per capita earnings (Van der Meerin, 1998), where one in four persons are directly dependent on this fishery (Horsford, 1999).

In 2007, capture production of finfish, Caribbean spiny lobster and Queen conch was 3,092 tonnes (live weight) and valued at US\$19.0 million. The spiny lobster, being one of the most valuable resources contributed to 18.4% of the total ex-vessel value of production.

2 HISTORY OF THE GROUPEL FISHERY

2.1 Overview of fishery

The largest among the fish esteemed in Antigua as articles of food is the “Jew-fish”, which commonly weighs from three hundred to four hundred pounds. The flesh is reckoned one of the greatest luxuries the West Indian seas afford. It is, however, but seldom caught – probably one reason for its being in such repute – its visits, like angels’ being “few and far between”. The king fish, grouper, barracoota, cavallie, are equally esteemed for their gastronomic qualities;

Snappers, hinds, silks, mullets, doctors, angels, old wives, nurses, Spanish mackerel, are among the other kinds of fish exposed for sale in the Antiguan market.

- Mrs. Lanaghan (1844), *Antigua and the Antiguan: A Full Account of the Colony and Its Inhabitants*.

Literature review of the early history of Antigua and Barbuda indicates that groupers (including hinds and Goliath grouper or Jewfish, *Epinephelus itajara*) have been commercial exploited and a favourite of natives as far back as the 19th century. However no evidence has been found of a targeted fishery for large groupers (e.g., Nassau grouper) as in the case of the seasonal targeting of Red hinds (*Epinephelus guttatus*) during the spawning period. As in the past, groupers (mainly Nassau, *Epinephelus striatus*; Misty, *Epinephelus mystacinus*; Yellowfin, *Mycteroperca venenosa*; Warsaw, *Epinephelus nigritus*; Red, *Epinephelus morio*; and Tiger grouper, *Mycteroperca tigris*) are incidentally caught by the multispecies hand line fishery and to a less extent the trap fishery.

In terms of status of groupers, a survey by Munro and Blok (2003) of the north-eastern Caribbean indicated that stocks of Red hind appear to be in relatively good condition and many spawning aggregation sites are known. Conversely stocks of larger groupers have been greatly reduced; although spawning aggregations of Nassau grouper have been observed on the Antigua-Barbuda shelf and in the British Virgin Islands. Survey results also suggest that the relative economic status of fishers affects grouper stocks, in that countries with “good spiny lobster stocks” would tend to target lobster (Munro & Blok, 2003). The 1999-2000 and 2002-2003, Food and Agriculture Organization (FAO) studies on the spiny lobster and reef fish trap fishery of Antigua and Barbuda, indicated that it was a highly profitable investment (Horsford, 2001; Tietze, Prado, Le Ry, & Lasch, 2001; FAO, 2002; and Tietze, Thiele, Lasch, Thomsen, & Rihan, 2005); this may relate to why spawning aggregations of Nassau groupers are still observed.

2.2 Fishing locations and season

Spawning aggregations of Red hind are known off the east coast of the Antigua and Barbuda shelf and are targeted mainly by hand liners from January to March. Anecdotal information from fishers suggests that in the past spawning has taken place as early as late-November / December. Aggregations of Nassau grouper are also known in knolls around the central portion of the Antigua and Barbuda shelf, in depths of around 20 metres (Munro & Blok, 2003). These aggregations are not actively targeted by fishers. However, in 2000, a single conch dive boat landed record catches of Nassau grouper from spear fishing (409 kg on the first day and 318 kg on the second day from less than an 8 hour-trip). This resulted in the automatic suspension of spear fishing in Antigua and Barbuda waters.

The association of ciguatera poisoning with certain large species of grouper (mainly Yellowfin grouper, *Mycteroperca venenosa*) may also contribute to this pattern of exploitation. Certain hoteliers and restaurateurs avoid purchasing certain large species out of apprehension over ciguatera poisoning and possible litigation. Ciguatera has long been recognised as a serious health problem endemic to the north-eastern Caribbean.

2.3 Fishing methods, vessel type and gear

As stated previously, groupers are incidental catch of the multispecies hand line fishery and to a less extent the trap fishery. Typical hand liners (Figure 1) are mainly 25 feet fibreglass pirogues with an average crew of 3 individuals, each operating 1 or 2 monofilament lines consisting of 2 to 3 baited hooks. Imported squid and local sprat (mainly Redear herring, *Harengula humerali*) are the bait of choice. In 2007, there were 43 hand liners actively fishing in Antigua and Barbuda waters. The economics of hand line fishing, particularly the issue of “opportunity cost” with respect to the snappers as well as the demand for Red hind during the spawning season, are some of the factors that may determine the number of hand liners actively targeting Red hind aggregations. On average, snappers carry a higher ex-vessel value than groupers (US\$8.15 per kg as opposed to US\$7.33 per kg). With respect to traps, their impact on grouper stocks is somewhat dependent on the size of the funnel entrance, the time of year and area fished (i.e., whether the area is associated with spawning aggregations); in some cases funnels are designed to exclude large predators such as sharks thereby excluding certain large groupers.



Figure 1. Typical hand lining unit in Antigua and Barbuda (Photo: Fisheries Division, Antigua-Barbuda).

2.4 Socio-economic importance of the grouper fishery

In 2007, capture production of finfish, was 2,257 tonnes (live weight) and valued at US\$15.1 million. Regarding composition, groupers, snappers and grunts were the most dominant families. Ex-vessel value of production for these groups were US\$3.1 million, US\$3.1 million, and US\$2.1 million, respectively. Groupers accounted for 20.1% (454 tonnes) of finfish landings emphasizing their socio-economic importance. Red hind on average contributed to about 70% of the grouper landings. Figure 2 summarises the increasing trend in grouper landings for Antigua and Barbuda.

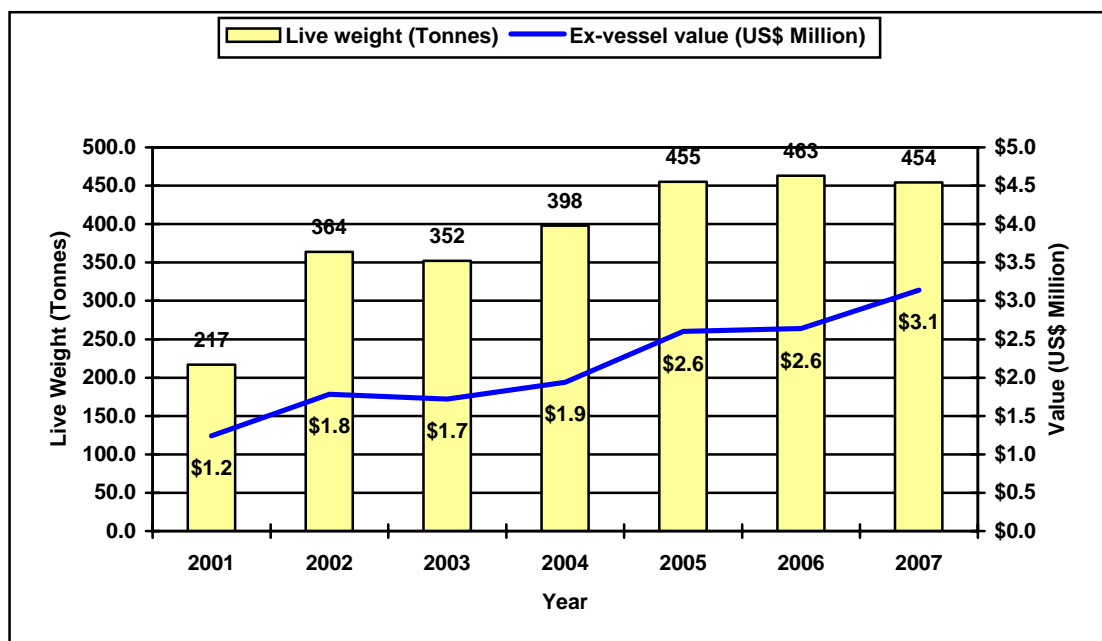


Figure 2. Quantity and ex-vessel value of capture production of groupers (Serranidae) for Antigua and Barbuda (Source: Fisheries Division, Antigua-Barbuda).

3 HISTORICAL AND CURRENT MANAGEMENT

3.1 Management measures

The *Fisheries Act, No.14 of 1983* and the *Fisheries Regulations, No.10 of 1990*, are currently the primary legislative basis for management and development of all fisheries including the grouper fishery. The Act and Regulations make provision for: the establishment of a fisheries advisory committee; fisheries research and enforcement; and the registration and licensing of fishing vessels. Also conservation measures such as: prohibiting the use of certain fishing methods; gear and species size restrictions; close

seasons; and the creation of marine reserves. Thus far, four marine reserves have been designated. Salt Fish Tail (Diamond Reef), off Antigua's northwest coast and Palaster Reef in Barbuda, declared in 1972 under the *Marine Areas Preservation and Enhancement Act* and Cades Bay and North East Marine Management Area, declared under the *Fisheries Act*. These sites include important nursery areas for groupers and other fish species as well as for the Queen conch and Caribbean spiny lobster. In addition to these reserves, Codrington Lagoon in Barbuda has been declared as a national park under the *National Parks Act (1984)* while the Nelson Dockyard National Park also includes marine areas. Codrington 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 also houses one of the largest breeding colonies in the Caribbean for the frigate bird (*Fregata magnificens*). With respect to the North East Marine Management Area, enclosed are some of the spawning aggregations sites for Red hind (*Epinephelus guttatus*) and Gray snapper (*Lutjanus griseus*).

In 2003, the Fisheries Division sought assistance from FAO to bring the *Fisheries Act (1983)* and the *Fisheries Regulations (1990)*, in line with current development in international fisheries law and related environmental agreements. The *Fisheries Act, No. 22 of 2006*, was passed in both the Lower and Upper House of Parliament and currently awaits a date of enactment. The Fisheries Division is in the final stage of updating the Fisheries Regulations, which improves on the current 1990 regulations, giving the Minister authority to set regulations concerning schemes for limiting fishing effort. In terms of the overall evolution of fisheries legislation there has been a shift in paradigm from "open access" to "limited entry" through the use of special permits. Fines have been revised under the new legislation and a close season for Red hind is currently being considered.

3.2 Management evaluation

In general, from a "biological perspective" spawning aggregations of groupers at predictable locations and distinct seasons have made these species highly vulnerable to over-fishing. However as with all multispecies fisheries (and single species fisheries) management measures have to be evaluated within the context of the broader fisheries (and ultimately the broader economy). For instance, while the biology of the species makes them highly vulnerable to over-fishing, the profitability of the spiny lobster and reef fish trap fishery (Horsford, 2001; Tietze, Prado, Le Ry, & Lasch, 2001; FAO, 2002; and Tietze, Thiele, Lasch, Thomsen, & Rihan, 2005) may have limited targeted effort applied to harvesting grouper resources. This is supported by the fact that no major relationship was observed in the number of active hand lining units over time when a linear trend line was fitted to the data; R^2 was close to zero indicating a poor fit of the data (Figure 3).

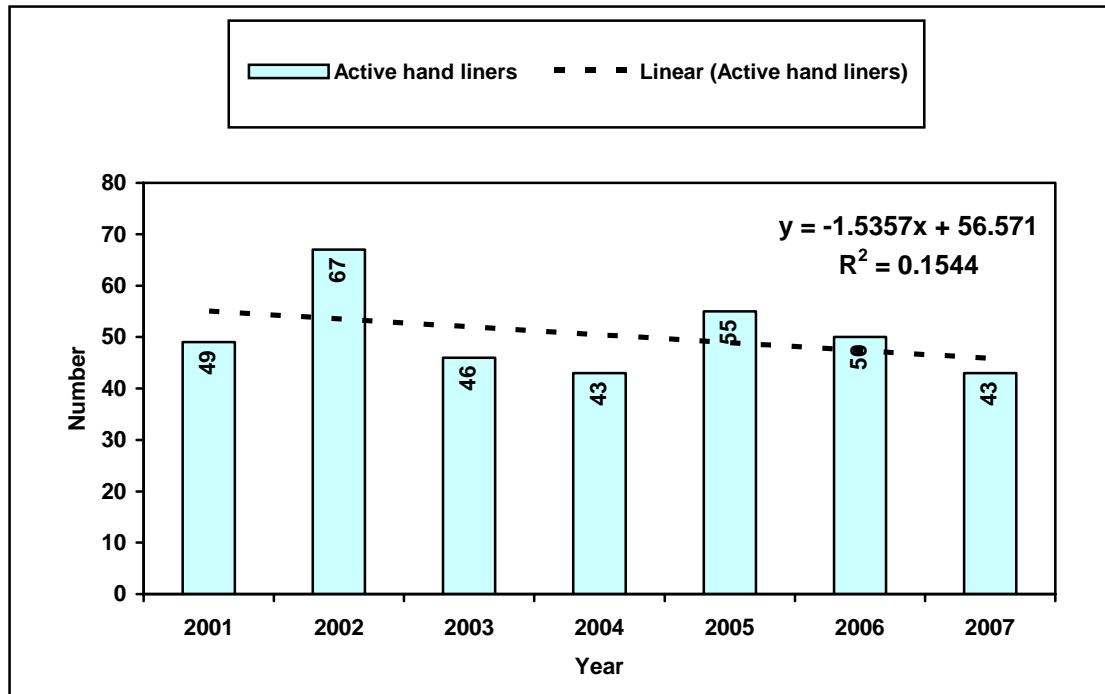


Figure 3. Trend in the number of active hand liners operating in Antigua and Barbuda based on annual fishing vessel census (Source: Fisheries Division, Antigua-Barbuda).

Although the time series data is limited, search of historical records yielded no evidence to support hand line being a major gear of choice for most fishers. Although hand lines were common they mainly functioned as a secondary gear in most commercial fishing operations. Anecdotal information from the following sources suggests traps have always been the primary gear of choice for fishers as far back as the early post-emancipation era.

Slavery left few swimmers. Hardly anybody could swim then. What they use to do was to set the pots around the seashore. They made small pots...bout two or two and a half to even three feet in length. The width could be anything less or the same. At times they may go as far out into the sea as they could stand up firmly in the water. People use to ketch (catch) good enough fish. Not any big big load all at one time but enough to satisfy them.

- Smith, K.B. & F.C. Smith (2003), *To Shoot Hard Labour 2: The Life and Times of Samuel Smith, an Antiguan workingman, 1877-1982.*

The main method used was the fish trap (locally called fish pot), made of wire mesh and usually rectangular in shape, proved to be the most efficient method for this type of fishing. Gill nets were also used in the bays. Some trolling was tried off the South-east coast, especially for king fish but the species proved very unreliable and this enterprise failed completely.

- Jeffrey, C.E. (1990), cites Brown, H.H. (1945), *The Fisheries of the Windward and Leeward Islands Report, Development and Welfare in the West Indies*.

In terms of catch per unit effort for hand line (Figure 4), no major relationship was observed over time (i.e., R^2 was close to zero indicating a poor fit of the data). An analysis of variance (ANOVA) confirmed that there was no significant difference amongst the annual mean catch per unit effort, $F(6, 227) = 0.95, p = 0.46$. This suggests that the increasing trend observed in grouper landings (Figure 2), was due to the growth in the trap fishery, since changes regarding the number of hand liners, their catch per unit effort and the mean number of days fished were not significant. Although fitting a linear trend line to the number of active trap setters did not confirm this (Figure 5, $R^2 = 0.20$), the growth observed from 2005 to 2007 coincided with increased grouper landings over the same period (Figure 2). Whereas traps may remove targeted effort from grouper resources, the aggregated impact of traps on the resource, alongside the loss of or degradation of critical habitats (e.g., mangroves, seagrass beds) due to coastal and tourism development (de Albuquerque & McElroy, 1995; Baldwin, 2000), may affect the long term sustainability of the resource. For these reasons, the Fisheries Division is committed to further declaration of additional marine reserves and marine management areas as a precautionary measure.

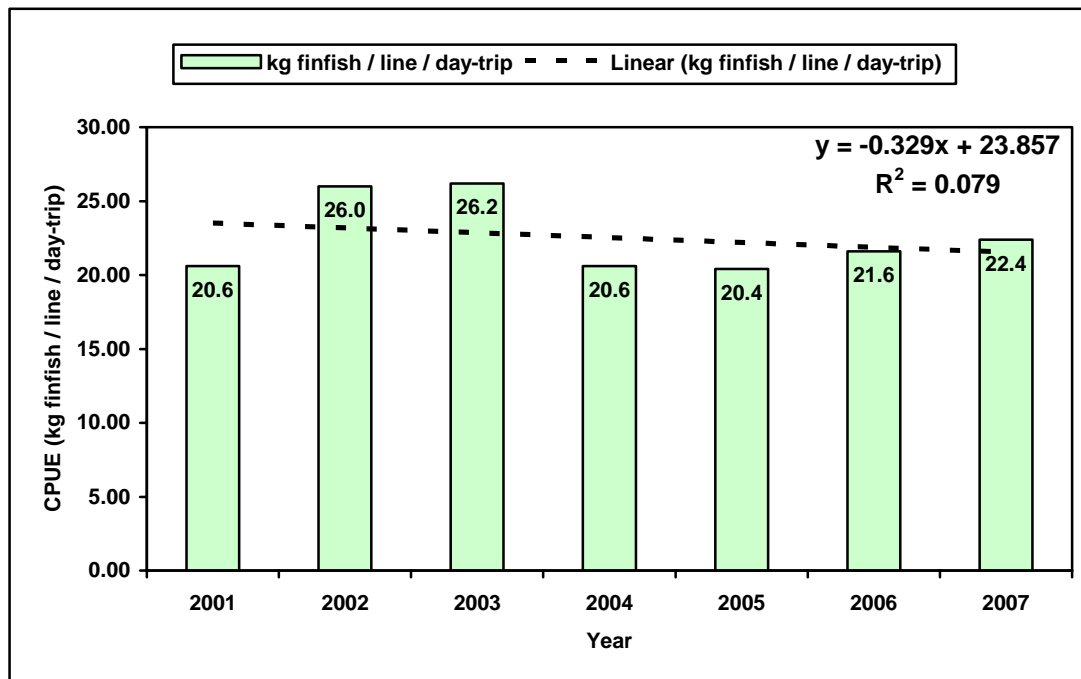


Figure 4. Trend in the mean catch per unit effort for finfish caught by hand line in Antigua and Barbuda (Source: Fisheries Division, Antigua-Barbuda)

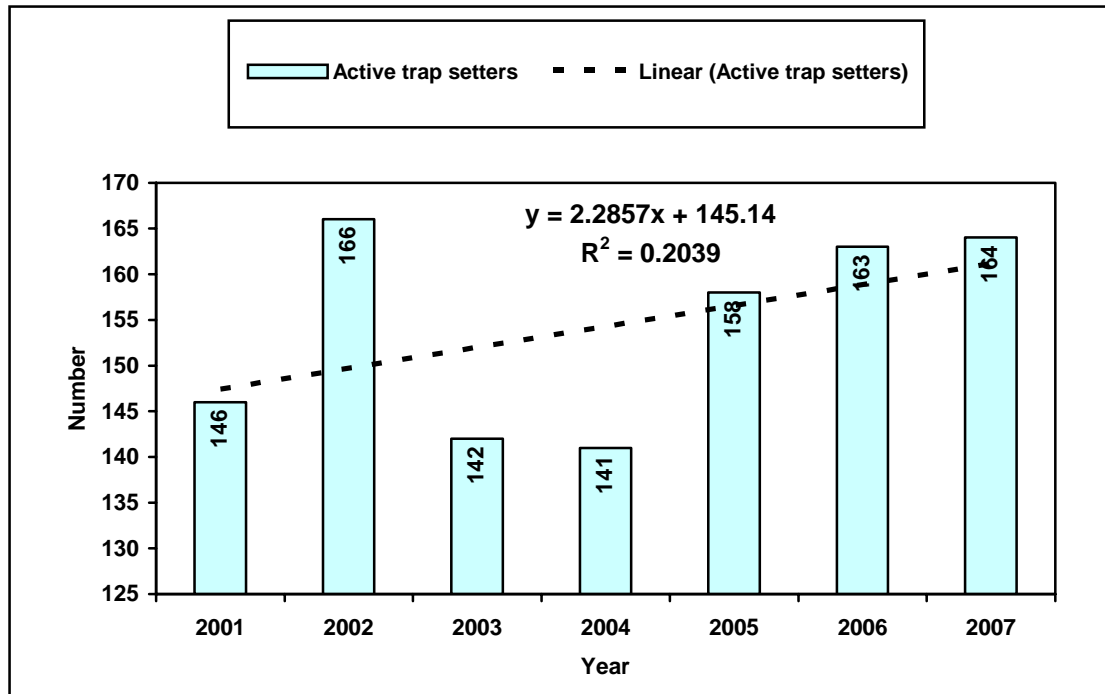


Figure 5. Trend in the number of active trap setters operating in Antigua and Barbuda based on annual fishing vessel census (Source: Fisheries Division, Antigua-Barbuda).

Figure 6 summarises the trends in percentage contribution to finfish landings for snappers, groupers and grunts, the three major families landed by traps and hand lines. Whilst no significant shifts were detected in percentage composition, the aggregation of the data at the family level may “mask” possible changes at the species level. Further refinement is needed in the data collection programme to address this issue as well as improve overall fisheries management.

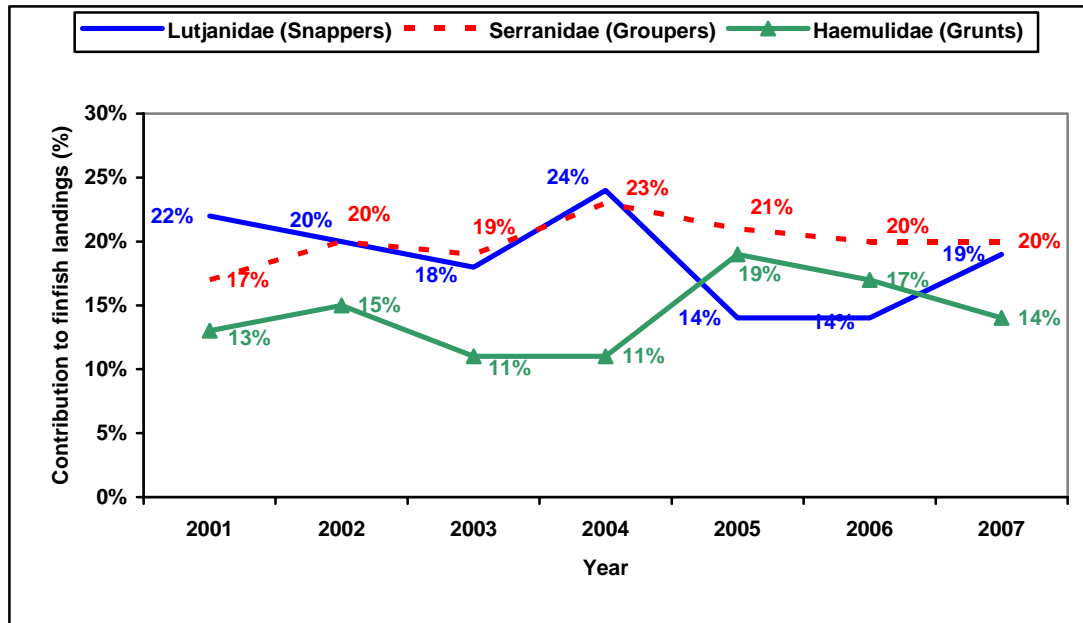


Figure 6. Trend in percentage contribution to finfish landings for the families Lutjanidae, Serranidae and Haemulidae (Source: Fisheries Division, Antigua-Barbuda).

4 RESEARCH NEEDS AND INFORMATION GAPS

Given the limitations of the Fisheries Division in terms of human resource and financing, any research programme to improve grouper management must be cost-effective and practical in view of the multispecies nature of the fisheries. Currently, groupers are monitored under the catch and effort data collection programme and the finfish biological programme where data on species, length, weight, and in some cases sex are collected. In recent times this has been broadened to collect data on maturity in order to determine spawning seasons for major commercial species. To-date most of the data collected relates to the Red hind since it is the most important commercial grouper species. Future research should focus on:

- validating and geo-referencing spawning aggregations that are not observed directly;
- determining annual variations in spawning time;
- developing cost-effective fishery-independent programmes to monitor aggregations; and
- refining the catch and effort data collection programme to collect data at the species level as well as improve monitoring of the economics of the entire fisheries since profitability is a major driver and predictor of future fishing effort.

REFERENCES

Baldwin, J. (2000). Tourism development, wetland degradation and beach erosion in Antigua, West Indies. *Tourism Geographies*, 2(2), 193-218.

de Albuquerque, K. & McElroy, J.L. (1995). *Antigua and Barbuda: a legacy of environmental degradation, policy failure and coastal decline. Supplementary paper no. 5* [Electronic version]. Washington: United States Agency for International Development, the Environmental and Natural Resources Policy and Training Project, and the Midwest Universities Consortium for International Activities, Inc.

Food and Agriculture Organization of the United Nations. (2002). *The state of world fisheries and aquaculture 2002* [Electronic version]. Rome: Food and Agriculture Organization of the United Nations.

Horsford, I. (2001). Economic viability of marine capture fisheries in Antigua and Barbuda – A case study. In U. Tietze (Ed.), *Report of the regional workshop on the effects of globalization and deregulation on fisheries in the Caribbean. Castries, St. Lucia, 4-8 December 2000. FAO Fisheries Report 640* (pp. 100 – 117). Rome: Food and Agriculture Organization of the United Nations.

Horsford, I. (1999). *A socio-economic survey of the fishers of Barbuda – implications for planning and development*. Antigua: Fisheries Division, Ministry Of Agriculture, Lands and Fisheries.

Jeffrey, C.E. (1990). *An analysis of operating costs and revenue of large fishing vessels in Antigua and Barbuda* (submitted in partial fulfilment of the requirement for the Diploma in Resource Management and Environmental Studies). Barbados: Centre for Resource Management & Environmental Studies, University of the West Indies.

Lanaghan. (1844). *Antigua and the Antiguans: a full account of the colony and its inhabitants from the time of the Caribs to the present day, interspersed with anecdotes and legends also, an impartial view of slavery and the free labour systems, the statistics of the island, and biographical notices of the principal families*. London: Saunders & Otley.

Munro, J.L., & Blok, L. (2003). The status of stocks of groupers and hinds in the northeastern Caribbean. In R.L. Creswell (Ed.) *Proceedings of the 56th Annual Gulf and Caribbean Fisheries Institute, Tortola, British Virgin Islands* (pp. 283 – 294). Florida: Gulf and Caribbean Fisheries Institute.

Smith, K.B., & Smith, F.C. (2003). *To shoot hard labour 2: the life and times of Samuel Smith, an Antiguan workingman, 1877-1982*. Ontario: Edan's Publishers.

Tietze, U., Prado, J., Le Ry, J-M., & Lasch, R. (2001). *Techno-economic performance of marine capture fisheries. FAO Fisheries Technical Paper 421* [Electronic version]. Rome: Food and Agriculture Organization of the United Nations.

Tietze, U., Thiele, W., Lasch, R., Thomsen, B., & Rihan, D. (2005). *Economic performance and fishing efficiency of marine capture fisheries. FAO Fisheries Technical Paper 482* [Electronic version]. Rome: Food and Agriculture Organization of the United Nations.

Van der Meerin, S. (1998). *The lobster fishery of Barbuda – a socio-economic study*. St. Lucia: Organisation of Eastern Caribbean States – Natural Resources Management Unit.