Fisheries Centre

The University of British Columbia

Working Paper Series

Working Paper #2013 - 04

Reconstruction of Total Marine Fisheries Catches for St. Kitts and Nevis (1950-2010)

Robin Ramdeen, Kyrstn Zylich and Dirk Zeller

Year: 2013

Email: r.ramdeen@fisheries.ubc.ca

RECONSTRUCTION OF TOTAL MARINE FISHERIES CATCHES FOR ST. KITTS & NEVIS (1950-2010)

Robin Ramdeen, Kyrstn Zylich, Dirk Zeller

Sea Around Us Project, Fisheries Centre, University of British Columbia, 2202 Main Mall, Vancouver, BC, V6T 1Z4, Canada

r.ramdeen@fisheries.ubc.ca; k.zylich@fisheries.ubc.ca; d.zeller@fisheries.ubc.ca

ABSTRACT

Under-reporting of catches in fisheries is a global issue. This report presents the reconstruction of total marine fisheries catches for St. Kitts and Nevis in the Caribbean for the period 1950-2010, which includes estimates of unreported catches of conch and lobster for the early time period, and under-reported artisanal and subsistence catches for the entire time period. Total unreported catches from 1950-2010 were estimated to be more than 45,000 t, with an average annual unreported catch of approximately 740 $t \cdot year^{-1}$ for both islands. Total reconstructed catches for St. Kitts and Nevis were estimated at 85,000 t for the 1950-2010 time period, which is nearly 90% higher than the landings of 45,179 t reported by FAO on behalf of St. Kitts and Nevis for the same time period. This estimate, which more comprehensively accounts for total living marine resource extractions by St. Kitts and Nevis, reflects the importance of small-scale fisheries in providing seafood to locals and visitors, and livelihoods to fishers.

INTRODUCTION

St. Kitts and Nevis are islands in the Caribbean Sea located between latitude 17.3° North and longitude 62.7° West. St. Kitts and Nevis have a combined land area of 261 km² and a total population of 50,000. Both islands are of volcanic origin, with steep escarpments, and hills in the interior and gentle plains along the coasts. The islands are separated by a 3 km wide channel named 'The Narrows', and share an Exclusive Economic Zone (EEZ) of around 10,200 km² (www.seaaroundus.org) (Figure 1).

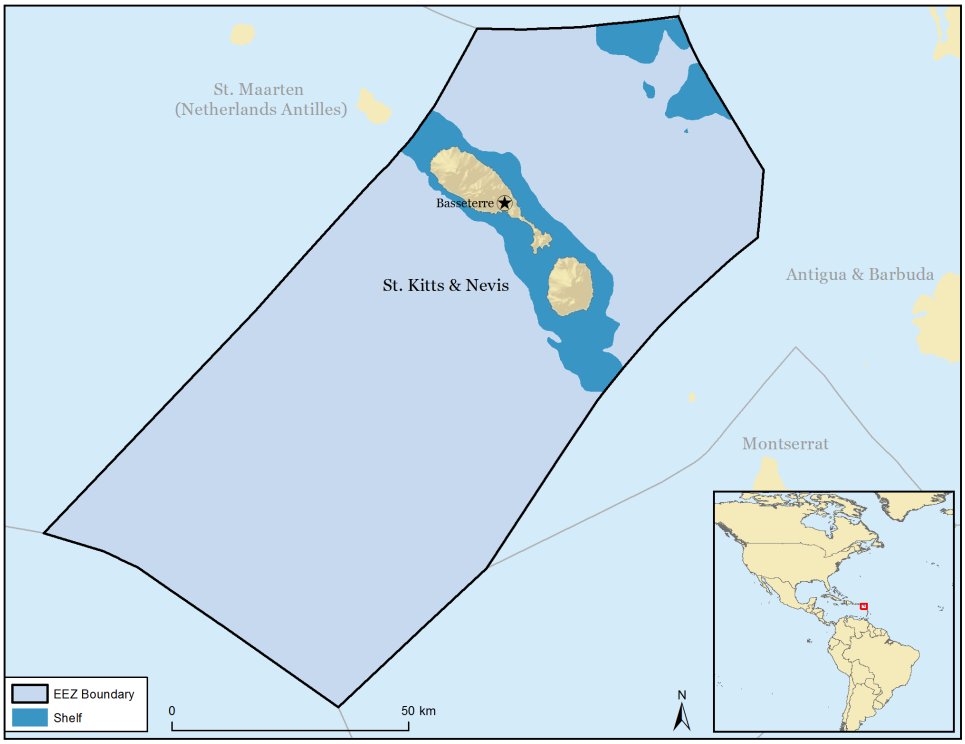

Figure 1. St. Kitts and Nevis in the Caribbean, showing the Exclusive Economic Zone (EEZ) and shelf area.

St. Kitts and Nevis is a federated state, which gained independence from British colonial rule in 1983. Historically, the competition for Caribbean supremacy between the British, French and Dutch began in St. Kitts in the year 1623, when Sir Thomas Warner claimed the island for Britain. Just two years later, a French expedition arrived,

and both groups agreed to share the island amicably. However the island's original native inhabitants, the Caribs (originating from South America), who had discovered St. Kitts long before the English or the French, were staking their claim. The Europeans and the Caribs signed an agreement to share the island peacefully. However, the Europeans wiped out the Caribs in a massacre at 'Bloody Point' in 1626 (Ferguson 1997).

Apart from human disasters, the islands are also susceptible to natural disasters. Each year, from June to November, hurricanes and tropical storms affect the islands. Most notable, Hurricane Hugo caused widespread damage to the islands' infrastructure in 1989, and Hurricane Georges left 3,000 people without homes in 1998.

The islands' economies are dependent on agriculture and tourism. In the past, major crops cultivated in St. Kitts included sugarcane, sea-island cotton and food crops (Colonial Office 1958). Today, the agriculture sector is defined in terms of sugar and cotton production on both St. Kitts and Nevis. Tourism is gradually replacing agriculture as a major economic contributor in St. Kitts, while agriculture, tourism, fisheries, boat building, construction and a small manufacturing sector form the economic base on Nevis (USAID 2008).

The fishing sector of each of these islands is primarily artisanal and subsistence oriented, with a small recreational sector. Furthermore, Japanese and other foreign fishing vessels have been observed fishing the islands' offshore waters (Wilkins 1984). The domestic fishing fleet is comprised of wooden boats (4-7 m), usually powered by outboard engines, although some still use sails and oars (Goodwin *et al.* 1985). The fishing gears utilized include pots and boat seines, some hand-lining and beach seining, and skin-diving is also practiced. The species targeted include: reef and demersal species, such as snappers and groupers, lobster and conch. Starting in the 1960s, beach seines were used to capture small schooling pelagics such as gars, ballyhoo (Belonidae) and jacks (Carangidae). Today, trolling near Fish Aggregating Devices (FADs) is the fastest growing fishing technique in St. Kitts. Fishers concentrate their efforts on

catching medium and large pelagics such as dolphinfish (Corryphaenidae) and tunas from January to June each year (Heyliger 2002).

Catches are landed at five major landings sites on St. Kitts: Basseterre East, Basseterre West, Old Road, Sandy Point and Dieppe Bay. On Nevis, there are eight important landing sites: Charlestown, Cane Bay, Indian Castle, Long Haul Bay, Newcastle, Jones Bay, Cotton Ground, and Jessups. There are two central markets on the islands: Bassetere fishing complex on St. Kitts, and a fisheries complex in Charlestown on Nevis. However, fishers also process and sell catches directly to customers at boat landing sites. If there is a surplus of fish, vendors will act as intermediaries. Seafood exports to Guadeloupe and Martinique include lobster, conch and finfish (Goodwin *et al.* 1985), though exact quantities are not published. Despite the importance of fish in exports and in the diet of the people on St. Kitts and Nevis, the islands are net importers of seafood, since local landings are not sufficient to meet the local demand (Wilkins 1984; Goodwin *et al.* 1985). Indeed, Colonial records state that approximately 545 t of fish (frozen, cured and canned) were imported to St. Kitts and Nevis in 1964.

Over time, there have been many changes in the reefs around the islands due to sediment runoff, hurricane damage and high fishing pressure. Fishers report declines in fish size, are spending longer periods of time at sea and are observing major declines in total catch (FORCE 2012a, 2012b). The Fisheries Departments on St. Kitts and Nevis are in charge of the management of coastal and marine resources on their respective islands. Both have the same method of data collection, which is based upon the CARICOM region data systems 'CARAFIS' (Heyliger 2011). Catch data on St. Kitts is collected from Monday to Saturday from main landing sites, while other sites are checked once a month. Raising factors are applied according to the number of fishing days and the gear type (Heyliger S., pers. comm., St. Kitts Fisheries Department, February 15, 2013). As for official reporting, it is unclear whether FAO contacts each island separately (Arthurton A., pers. comm., Nevis Fisheries Department, February 22, 2013) or if they report federal fisheries landings collectively (Helyiger S., pers. comm.,

St. Kitts Fisheries Department, January 20, 2013). The level of trust and collaboration between island administrations is strained; therefore information may not be reliable.

Accurate catch data are important as the most fundamental baseline for evaluation of the state of fisheries resources. A review of all available fisheries literature on St. Kitts and Nevis was undertaken, along with data accessed from the Fisheries Department in St. Kitts in order to (1) provide an improved estimate of total marine fisheries catches for St. Kitts and Nevis for the time period 1950-2010, and (2) improve the taxonomic detail of the reported and unreported catch.

METHODS

The fisheries of St. Kitts and Nevis have been reported on by FAO (1969), George (1976), Goodwin *et al.* (1985), Barrett *et al.* (1988) and Heyliger (2011). It was difficult to accurately analyze the catch data gleaned from these reports; therefore, we also relied on seafood consumption rates derived from the neighboring island of Anguilla (Jones 1985) to guide us in our estimation. Assuming a similar consumption pattern as on Anguilla, we combined the household consumption rates from Jones (1985) with local population data, and reconstructed the likely local seafood demand on St. Kitts and Nevis. We also estimated consumption by visiting tourists and catches from the small recreational sector. Taking the average species composition from the national catch dataset (1995-2010), we were able to improve on the likely taxonomic composition of catches presented in the FAO data for the early time period (1950-1995).

Human population and tourists

Human population data for St. Kitts and Nevis were available from the World Bank[1] for most years. Using linear interpolation for years with missing data, we reconstructed the local population on the islands from 1950-2010 (Figure 2).

[1] http://data.worldbank.org/ [Accessed: February 2013]

Data on the number of stop-over tourists (travelers who stay on the island for more than a day), were available from the Government Statistics Department for 1978-2006 and from the Caribbean Tourism Organization[2] for 2000-2010. We assumed tourism began in 1950, and a linear interpolation was done to estimate the tourist population in years with missing data.

Catches satisfying local demand

According to a household consumption survey on the neighboring island of Anguilla (Jones 1985), annual *per capita* fresh seafood consumption was 23.6 kg fish, 0.8 kg lobster and 1.8 kg conch. Assuming these rates remained constant over time, we combined these rates with the St. Kitts and Nevis population data, to estimate the catches that would satisfy local demand of these islands. To assign small-scale catches to artisanal (i.e., commercial) and subsistence (i.e., non-commercial) sectors, it was assumed that in 1950, 90% of small-scale catches were for subsistence purposes and 10% were for sale (artisanal). In 2010, 40% of small-scale catches were attributed to the subsistence sector and 60% to the artisanal sector. A linear interpolation was done between these two years to derive an assumed percentage assignment by sector for the entire 1950-2010 time period.

Recreational

According to a global study of recreational fishing (Cisneros-Montemayor and Sumaila 2010), the proportion of recreational fishers in St. Kitts and Nevis in 2003 was estimated as 0.23%. Since sport fishing is an activity that is associated with tourism (Campos 1984), we assumed all of these fishers were tourists. We applied this rate constantly from 2000 to 2010. For the year 1950, we assumed a participation rate of 0.11% (half that of the later time period) of the tourist population. Linearly interpolating between these two rates, we derived recreational fishing participation rates of the tourist population for the time period 1950-2010. Assuming tourists are likely to participate in just one fishing trip during their stay, and assuming a

[2] http://www.onecaribbean.org/ [Accessed: August 2012]

conservative catch rate of 4.5 kg·tourist^{-1}·year^{-1}, we were able to estimate likely minimum catches from this sector.

Catches satisfying tourist demand

In many parts of the world, fishers have so-called 'direct' customers, such as hoteliers and restaurateurs, whom they supply directly with fresh seafood catches, which often by-pass landings sites and monitoring procedures. Community reports from Jessups, Nevis and Dieppe Bay, St. Kitts, state that most fishers sell their catch to hotels (FORCE 2012a, 2012b). Thus, seafood supplying the tourist market, such as hotels and restaurants, were reconstructed separately. Annual tourist population data were combined with data on the average length of stay, i.e., approximately 10 days according to the Caribbean Tourism Organization. Taken together with inferences about the frequency of seafood consumption (i.e., one serving of seafood per day) and a typical serving proportion of 250 g (round weight), we applied the following equation to estimate tourist seafood demand annually:

$$Tourist\ seafood\ demand = \#\ tourist\ days\ x\ average\ serving\ size\ x\ \#\ servings/day$$

Using this calculation, we were able to reconstruct small-scale catches provided directly to the tourist market from 1950 to 2010, which we assumed did not enter the reporting system.

Taxonomic breakdown

The dataset supplied to the FAO by St. Kitts and Nevis is dominated by the uninformative pooled group 'marine fishes nei', and marine invertebrates, such as Caribbean spiny lobster (*Panulirus argus*) and 'Stromboid conchs nei', that do not appear on record until 1970 and 1994, respectively. From 1995 onwards, a more detailed breakdown of catches was provided to the FAO. As mentioned previously, catches of lobster, conch and fish were reconstructed separately. To improve on the taxonomic breakdown for 'marine fishes nei', we created a new breakdown for 1950 based on ecological knowledge of Caribbean reefs and dominant fishing practices in the

early time period (Table 1). Interpolating the percentage composition from 1950 to 1995, while leaving FAO breakdown from 1995 to 2010 as is, we provided species composition for fish catches in the following sectors: reported artisanal 'marine fishes nei', reported subsistence 'marine fishes nei' and all unreported fish catches (Table 1).

Table 1. Taxonomic breakdown used for fish catches from St. Kitts and Nevis (for both the reported 'marine fishes nei', as well as all unreported artisanal and subsistence fish catches) as derived for 1950 and as reported for 1995 based on FAO data. Intervening years were interpolated.

	Proportion	
Major taxa	**1950**	**1995**
Bigeye scad	0.04	0.00
Flyingfishes nei	0.04	0.28
Needlefishes, etc. nei	0.04	0.16
Tuna-like fishes nei	0.00	0.01
Wahoo	0.00	0.00
Common dolphinfish	0.00	0.04
Grunts, sweetlips nei	0.05	0.01
Goatfishes, red mullets nei	0.08	0.04
Parrotfishes nei	0.15	0.09
Squirrelfishes nei	0.07	0.04
Surgeonfishes nei	0.08	0.07
Triggerfishes, durgons nei	0.05	0.04
Marine fishes nei	0.05	0.05
Groupers nei	0.20	0.12
Snappers nei	0.15	0.05

RESULTS

Due to continued emigration, the local population trend has been flat to slightly declining between the mid 1960s and late 1990s, but began increasing again in the 2000s (Figure 2a). However, the population of visitors to the island has steadily increased over the years, doubling in two decades from around 64,000 tourists in 1987 to over 120,000 in 2007 (Figure 2 b).

From 1950 to 2010, reconstructed catches for St. Kitts and Nevis for the artisanal (i.e., small-scale, commercial) sector totaled approximately 33,000 t, catches for the

subsistence sector amounted to 51,500 t, and the recreational sector in St. Kitts and Nevis contributed 26 t to the total reconstructed catch (Figure 3a).

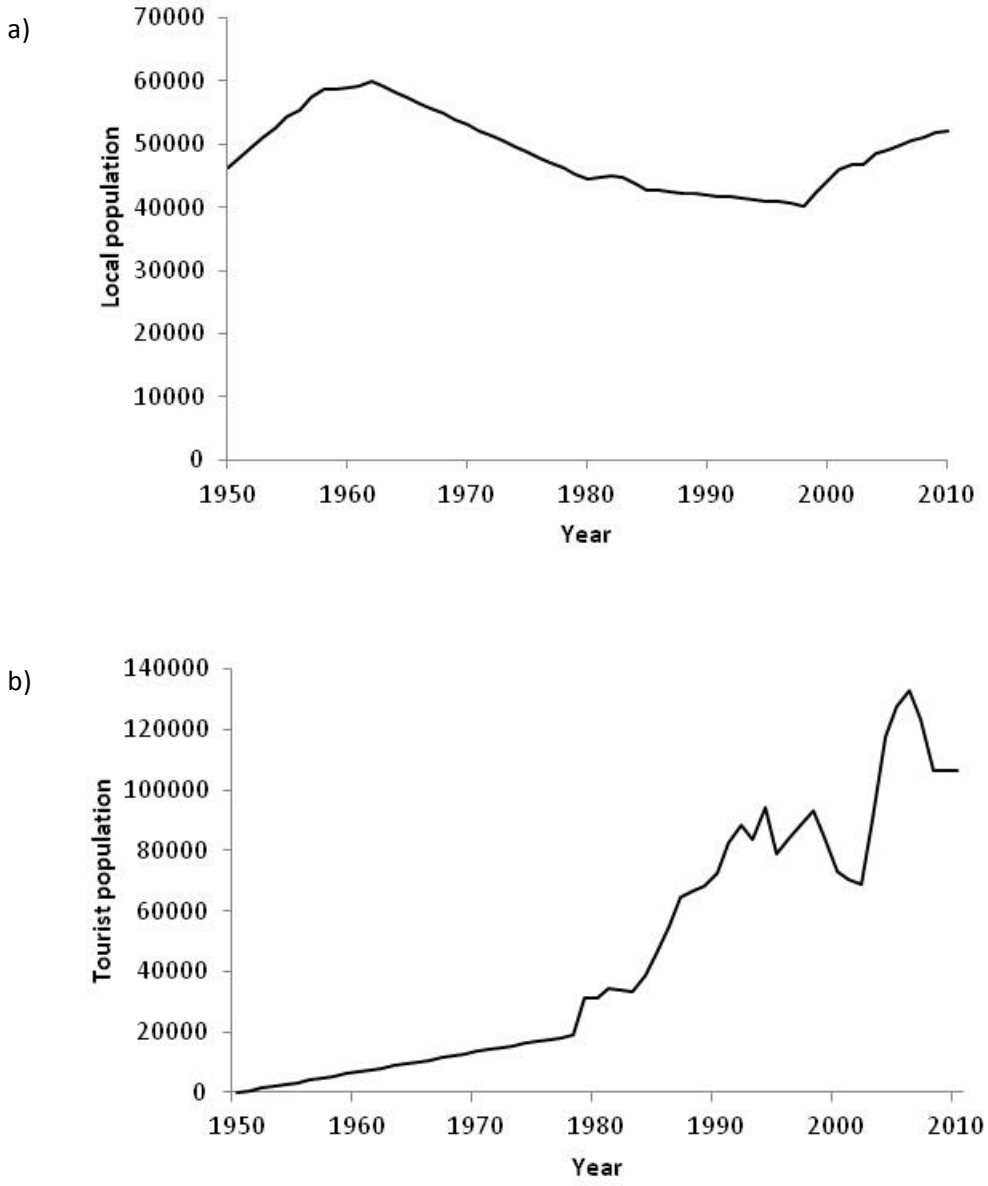

Figure 2. Human population data for St. Kitts and Nevis, showing a) total local population; and b) stop-over tourists. Sources: World Bank, St. Kitts and Nevis Government Statistics Department, Caribbean Tourism Organization.

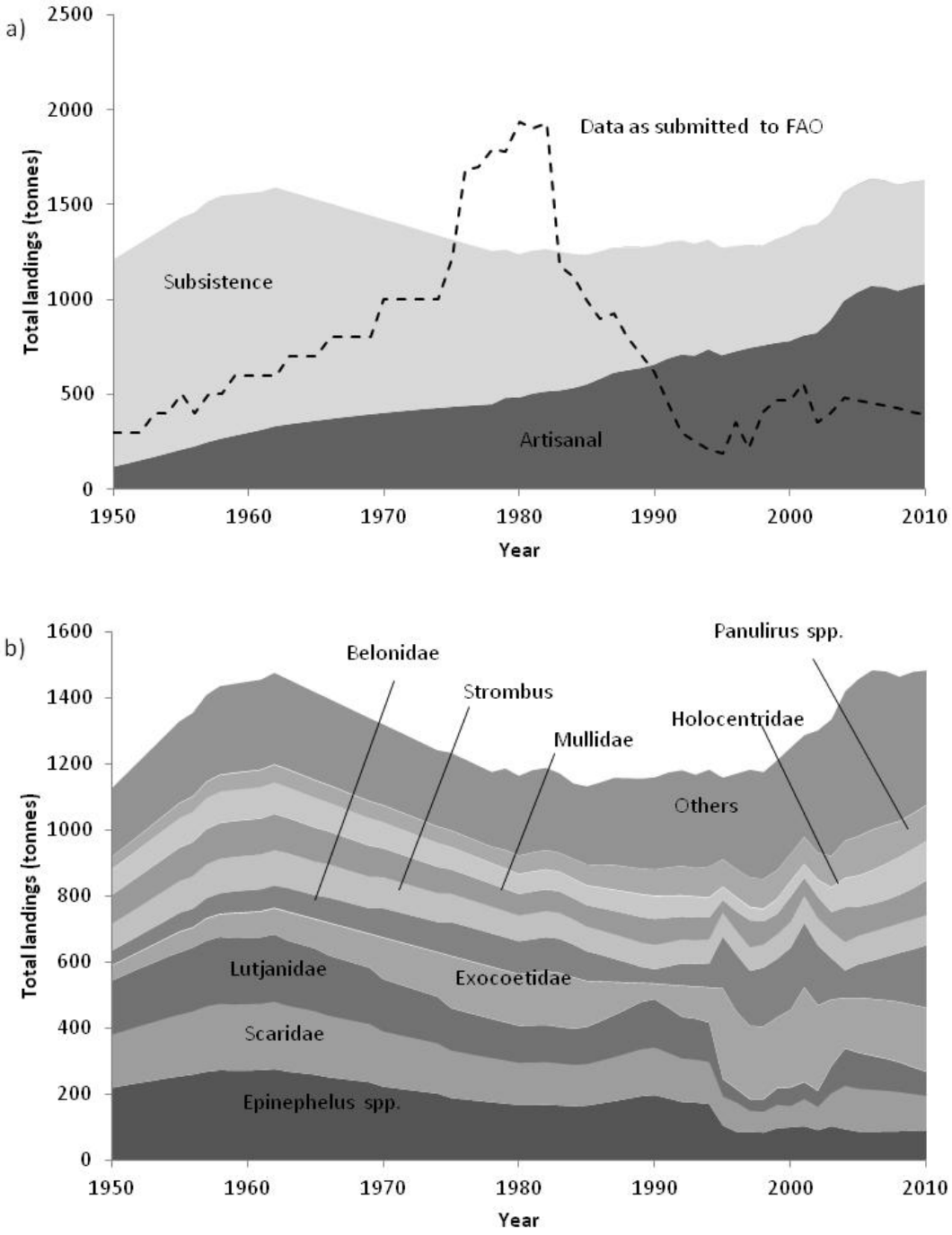

Figure 3. Total reconstructed catches for St. Kitts and Nevis, by a) fisheries sector (recreational catches are included but are too low to show) with landings data as reported to FAO overlaid as line graph; and b) major taxa, with the 'others' category consisting of seven additional families with smaller contributions.

From 1976 to 1982, there was a peak in reported landings of fish and lobster in the St. Kitts and Nevis data supplied to FAO. Since we found no information to explain this sudden and short-lived peak in reported landings, we did not accept the FAO record from 1976-1982. Total unreported catches for the period 1950-2010 were estimated at slightly over 45,000 t, with average annual unreported catches of 740 t·year^{-1} (Figure 3a).

Total reconstructed catches for St. Kitts and Nevis for the period 1950-2010 were estimated to be just over 85,000 t, which is nearly 90% higher than the reported landings of 45,179 t as presented by the FAO on behalf of St. Kitts and Nevis.

Catches were dominated by major reef taxa (Figure 3b) such as groupers (Serranidae 13%), parrotfishes (Scaridae 10.5%) and snappers (Lutjanidae 9.5%). Small pelagic taxa including flyingfishes (Exocoetidae 9.4%) and gars (Belonidae 7%) were significant, also. Smaller reef taxa, such as squirrelfish (Holocentridae 5.3%) and goatfishes (Mullidae 6%) were also important components of the catch. Catches of marine invertebrates such as *Panulirus argus* (5%) and *Strombus gigas* (6.3%) were also common. The 'Others' category made up the remaining 28% of catches and comprised 5 pelagic families including Corryphaenidae, Scombridae and Sphyraenidae and 2 reef families, Balistidae and Haemulidae (Figure 3b).

DISCUSSION

St. Kitts and Nevis are small island developing states in the Caribbean Sea. They have a narrow resource base and depend heavily on tourism for their economy. Fishing plays a vital role in St. Kitts and Nevis, especially for local food security. When there is a decline in other sectors, such as the tourism sector, islanders turn to fishing to supplement their income. However, since the 1980s, over-fishing has been documented on the reefs of St. Kitts and Nevis (Goodwin *et al.* 1985). From 1950 to 2010, we estimated average annual unreported fisheries catches to be approximately 740 t·year^{-1},

or as much as 80% of total catches in some time periods. Unfortunately, under-reporting of catches can mask over-fishing, and lead to erroneous interpretations of fisheries trends.

Our estimates show average annual unreported lobster and conch catches from St. Kitts and Nevis to be approximately 40 t·year^{-1} and 70 t·year^{-1}, respectively. Today, lobster and conch populations are considered to be over-exploited in near-shore areas (Heyliger 2010). With growing tourist populations, demand for high value species is placing unsustainable pressure on the local marine resources. Unreported fishing and rising tourist populations are challenges to St. Kitts and Nevis small-scale fisheries. In addition, catches from an associated recreational sector are not being captured by the present data collection system. Reconstructed recreational catches amounted to approximately 26 t for the study period, and though small, should not be overlooked.

Fish is recognized as an important source of protein for the local people and many prefer it over alternatives such as chicken, pork or beef. Both, the local population and visiting tourists rely on or prefer seafood nutrition. Despite the economic and cultural significance of marine fisheries to these islands, the contribution of the small-scale fisheries to food and nutritional security, poverty alleviation and economic development is undervalued (FAO 2013). Low priority is given to the fisheries sector in Caribbean islands and the institutions in charge of fisheries management suffer from limited financial support and staffing. Plans for a federal reporting system for St. Kitts and Nevis have been discussed but are not yet realized (S. Heyliger, pers. comm., St. Kitts Fisheries Department, February 2013). It is unclear at this time whether both islands report separately to the FAO. Evidently, there is a lack of trust between the fisheries departments of St. Kitts and Nevis, and information sharing is strained. A key objective is recognizing that reliable data and information are imperative for developing appropriate guidance for small-scale fisheries development (FAO 2013) and has yet to be achieved in St. Kitts and Nevis.

Our reconstructed catches were 90% higher than the landings reported by the FAO on behalf of St. Kitts and Nevis over the 1950-2010 time period. There is also a small export market which was not addressed in the reconstruction. Our reconstructed catch used the reported FAO breakdown as a starting point, as such, only minor improvements to the reported taxonomic breakdown was achieved (i.e., 17 FAO families vs. 20 reconstructed families). Given that no quantitative catch composition data were available, our reconstruction is the best representation of total catches made by St. Kitts and Nevis at present.

ACKNOWLEDGEMENTS

This work was completed as part of the *Sea Around Us* Project, a scientific collaboration between The University of British Columbia and The Pew Charitable Trusts. We are grateful to Mr. Heyliger of the Department of Fisheries for his assistance in understanding the fisheries sector of St. Kitts and Nevis. We would also like to thank Ms. Jeanel Georges for her help in accessing documents at the Caribbean Development Bank in Barbados.

REFERENCES

Barrett A, Heyliger S, Wilkins R, Henry S and Mahon R (1988) A fishery data collection system for St. Kitts and Nevis. pp. 129-140 *In* Rosenberg AA and Mahon R (eds.), Fishery data collection systems for Eastern Caribbean Islands 2. Organization of Eastern Caribbean States (OECS), Bridgetown, Barbados.

Campos JL (1984) Caribbean sport fishing. pp. 71-76 *In* Elwood KH and Stroud RH (eds.), World angling resources and challenges: Proceedings of the First World Angling Conference. International Game Fish Association, Cap d'Agde, France.

Cisneros-Montemayor AM and Sumaila UR (2010) The global socioeconomic benefits of ecosystem-based marine recreation: potential impacts and implications for management. Journal of Bioeconomics 12: 248-265.

Colonial Office (1958) St. Kitts-Nevis-Anguilla: report for the years 1958-1962. Commonwealth Office, London.

FAO (1969) Report to the Government of Saint Kitts Nevis and Anguilla: Exploratory and experimental fishing around Saint Kitts and Nevis. United Nations Development Programme & Food and Agriculture Organisation of the United Nations, Rome. 6 p.

FAO (2013) Report of the FAO/CRFM/WECAFC Caribbean Regional Consultation on the Development of International Guidelines for Securing Sustainable Small-Scale Fisheries, Kingston, Jamaica,6-8 December 2012. Fisheries and Aquaculture Report. No. 1033, Food and Agriculture Organization of the United Nations, Rome. 41 p.

Ferguson J (1997) Eastern Caribbean: A Guide to the People, Politics and Culture. Interlink Publishing Group Incorporated, New York. 82 p.

FORCE (2012a) The Force Project: Future of Reefs in Changing Environment, Dieppe Bay, St.Kitts. St.Kitts and Nevis Community Report, St. Kitts and Nevis. 6 p.

FORCE (2012b) The Force Project: Future of Reefs in Changing Environment, Jessups Bay, Nevis. St.Kitts and Nevis Community Report, St. Kitts and Nevis. 6 p.

George AI (1976) Development of fishing industry in St. Kitts and Nevis. Preliminary report, Permanent Secretary of Agriculture, Baseterre, St Kitts. 39 p.

Goodwin M, Orbach M, Sandifer P and Towle E (1985) Fishery sector assessment for the Eastern Caribbean: Antigua/Barbuda, Dominica,Grenada, Montserrat, St. Christopher/Nevis, St. Lucia, St. Vincent & Grenadines. Island Resource Foundation, St.Thomas, USVI. 161 p.

Heyliger S (2002) National report of Saint Kitts. Ministry of Agriculture, Fisheries, Co-operative Lands and Housing, Basetterre, St. Kitts. 3 p.

Heyliger S (2010) Department of Fisheries Report. Ministry of Agriculture, Co-operative Lands and Housing, Basetterre, St. Kitts. 12 p.

Heyliger S (2011) Report on Frame Survey, St. Kitts. Ministry of Agriculture, Co-operative Lands and Housing, Basetterre, St. Kitts. 7 p.

Jones TP (1985) The fishing industry of Anguilla 1985. A report prepared for the Anguillan government and commonwealth secretariat, Anguilla. 38 p.

USAID (2008) FAA 118/119 Tropical forests and biodiversity assessment. Antigua & Barbuda, Dominican, Grenada, St.Kitts & Nevis, St.Lucia and St.Vincent and the Grenadines. USAID, Bridgetown, Barbados. 223 p.

Wilkins R (1984) The St.Kitts/Nevis fishery: A summary of the existing situation and constraints and requirements affecting development. Ministry of Agriculture, Lands, Housing, Labour and Tourism, Basseterre, St.Kitts. 3 p.