Reconstruction of total marine fisheries catches for Dominica (1950-2010)[1]

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Abstract

Fisheries catch misreporting occurs world-wide, and Caribbean fisheries are no exception. Under-reporting catches may lead to erroneous expectations about trends and present or future resource levels, this must be addressed in order to create realistic national, regional or international policies. This report presents the reconstruction of total marine fisheries catches by Dominica for the period 1950-2010, which includes estimates of unreported small-scale fisheries catches. Reconstructed total domestic fisheries catches for the period 1950-2010 were estimated to be nearly 85,000 t, which is 1.8 times the official reported landings of 46,523 t as supplied to FAO. This substantially higher catch better reflects the historical importance of fisheries in meeting domestic food requirements, as well as the deficiency of the present accounting system.

Introduction

The Commonwealth of Dominica (referred to as 'Dominica' throughout this report) is located at 15 °18' N and 61° 23' W between the French islands of Guadeloupe (in the north) and Martinique (in the south) (Figure 1). It has an Exclusive Economic Zone (EEZ) of approximately 28,500 km² (www.seaaroundus.org). The rich diversity of ecosystems and wildlife has earned Dominica the title "Nature Island of the Caribbean." There are approximately 1,200 species of plants, 18 species of terrestrial mammals, 19 species of reptiles and the most diverse avifauna of the Lesser Antilles with 175 species of birds including two endemic parrots (Anon. 2001a). Originally settled by *Caribs* (Native Indians originating in South America) and visited by Christopher Columbus in 1493, Dominica went back and forth between French and British colonial rule for over a century (1627-1783; Honychurch 1995). In 1865, Dominica became a British crown colony and eventually gained independence from Britain in 1978. Since then, Dominica has experienced a relatively stable political history. The weather on the other hand, has been highly unstable. Between 1886 and 1996, Dominica experienced 59 tropical storms, of which 19 were hurricanes (Anon. 2008). These hurricanes have caused extensive damage to many of Dominica's assets, including its fisheries sector: in 1979, Hurricane David almost entirely demolished the island's fishing fleet; storms in 1996, 1997 and again in 1999 damaged coral reefs, seagrass beds, beach landing sites, and fisheries infrastructure, with estimated damages of EC$ 7.6 M (US$2.8 M; Anon. 2000).

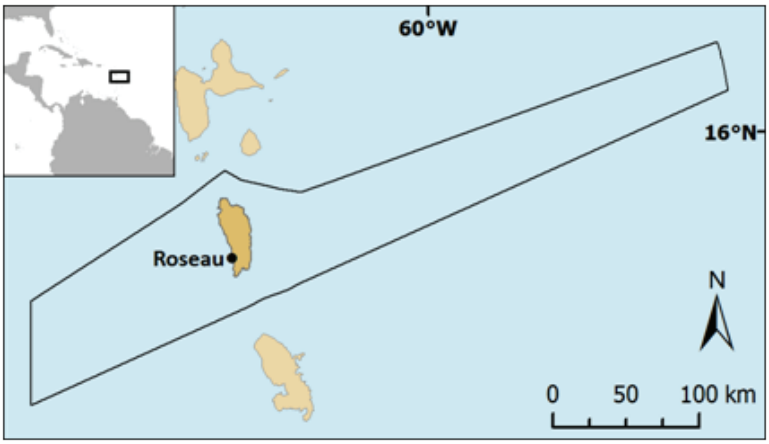

Figure 1. Extend of the Exclusive Economic Zone (EEZ) of Dominica. The inset map shows its location in the wider Caribbean region.

Human migration has been another major issue for this Eastern Caribbean island, both historically and at present. During the 1800s, many Dominicans emigrated to work in mines in Venezuela and French Guinea, and in the early 1900s to Panama to build the Canal. More recently, there have been two waves of migration from the island: from 1959 to 1962, with the majority of islanders settling in the United Kingdom, and from 1983 to 1992 to the United States. Lack of opportunity for education and employment is thought to be the major driving force behind this movement (Fontaine 2006).

Economically, Dominica's GDP per capita stands at 7,100 USD (2011 value; 73rd World position), which is approximately 2,000 USD less than the average GDP per capita of small Caribbean islands (www.data.worldbank.org). However, Dominica's eco-tourism sector may offer a brighter future as it is a growing source of revenue. Tourists are indeed attracted by Dominica's tall mountains, dense rainforests, fast-flowing rivers and waterfalls. Consequently, the Government is currently trying to revive the economic sector through promoting eco-tourism, along with developing an offshore banking sector.

Traditionally, Dominica has relied on agriculture and fishing as a means of self-sustenance. In the early 1900s, leading export crops included lime, bananas and vanilla (Fentem 1960), but the agricultural sector regularly suffered from hurricane damage and labor shortages. Thus, Dominica has always been heavily reliant on imported food

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commodities, including seafood, to meet domestic demand. The bulk of imported seafood products are in the form of salted cod from Canada (Mitchell and Gold 1983; Sebastien 2002; FAO 2011). Despite this trade reliance, small-scale fisheries in Dominica have always contributed to the food security of the island's small population (Anon. 2006a), although it appears not to be accounted for in official statistics. Here, we consider small-scale fisheries to include three sectors: subsistence, artisanal, and recreational. Subsistence fishing refers to any fishing activity that is not aimed at generating an income but at supplying necessary daily food. Artisanal fishing is on the contrary carried out with the primary aim of "fish for money", meaning that catches are usually being sold on local markets or exported. Recreational fishing refers to fishing where the main motivation is not consumption, trade or sale of the catch, but rather enjoyment.

Fishing in Dominica is largely artisanal in nature (Mitchell and Gold 1983; FAO 2002) and has been a traditional occupation for coastal inhabitants (Honychurch 1995) with many fishers operating at a subsistence (Anderson and Mathes 1985) and artisanal level. A small recreational fishing sector has developed in the last decade due to the development of the tourism sector. The artisanal sector consists predominantly of part-time fishers who operate from motorized vessels, including dugout canoes up to 6 m in length, "keel" boats which range from 4-7 m and fiber reinforced plastic vessels (FAO 2002). This fishery is seasonal, with a high season from January to June when pelagic species such as flyingfish (Exocotidae), tuna (*Thunnus* spp.), dolphinfish (*Corryphaena hippurus*) and kingfish (*Scomberomorus cavalla*) are targeted with trolling, gillnets, hand lines and beach seines, and a low season from July to December, when demersal species are targeted with handlines and fishpots (Anderson and Mathes 1985).

While there are minor reef and demersal fisheries, historically, pelagic species have been the major focus of the Dominican fisheries (FAO 1987). The island has a very narrow continental shelf, which drops very sharply into submarine valleys and canyons (FAO 2007). As a result, Dominica's nearshore waters tend to be very deep, and demersal resources such as conch (*Strombus gigas*) and lobster (*Panulirus argus*) are very limited (Mitchell and Gold 1983; FAO 2007). Fish Aggregating Devices (FAD) were introduced in Dominica in 1987, to increase catches of large migratory pelagics. However, due to the lack of knowledge about selecting mooring sites and the cost of constructing FADs, it took several training sessions by the Inter-American Institute for Cooperation on Agriculture for FADs to catch on in Dominica (Anon. 2005).

Nearshore fisheries resources are severely depleted in most Caribbean areas (Fanning *et al.* 2011) and the situation is no different in Dominica. By the mid-1980s, snappers (Lutjanidae), groupers (Serranidae), parrotfishes (Scaridae), grunts (Haemulidae) and squirrelfishes (Holocentridae) had already been overfished (Guiste and Gobert 1996) by locals and foreign fishers alike (Anderson and Mathes 1985). Illegal fishing is prevalent in Dominica, with local fishers complaining about competition from French fishers from Guadeloupe and Martinique operating without permission and using more advanced and efficient gears in Dominica's EEZ (Brownell 1978). However, Dominican fishers are also guilty of fishing illegally outside their water, at Aves Island. Aves Island, also known as Bird island, is a bird sanctuary made mostly of sand and coral (Fontaine 2002). Located 140 miles west of Dominica, the island is indeed a Caribbean dependency of Venezuela who has a coastguard station there since 1979, and to our knowledge, there is no fishing agreement between Venezuela and Dominica.

All catches of demersal and pelagic species are for local consumption (either for direct subsistence or sale at local markets), as there are no records of fish exports (Sebastien 2002; FAO 2011). Processing and marketing of catches is done by the fishers themselves, with few middlemen or vendors (Anderson and Mathes 1985). Cold storage facilities are often lacking at fishing centers and there is limited practice of drying and salting of fish (Goodwin *et al.* 1985). In 1997, the Roseau Fisheries Complex was established, with funding assistance from the Japanese Government, giving fishers a central market for dispersal of catches. Prior to this, fish was sold directly at landing sites (Anderson and Mathes 1985).

The number of people actively involved in Caribbean fisheries was estimated to be approximately 505,00 in the 1990s (Fanning *et al.* 2011). Despite the importance of fisheries in providing employment and high quality protein for the Caribbean people, the small-scale nature of fishing operations earns the sector a low ranking on government agendas. It is therefore not surprising that fisheries data collection in Dominica only began in 1986[2] and covers only major landing sites and major species landed (Guiste *et al.* 1996). Thus, several components of total fisheries removals have not been recorded. This problem is widespread, as evidenced for example for the two neighboring islands of Guadeloupe and Martinique (Frotte *et al.* 2009a, 2009b).

Using the approach as these authors, as described by Zeller *et al.* (2007), total marine fisheries catches for Dominica were reconstructed since 1950. We used the FAO Fish Stat database (FAO 2012) as reported catch baseline, as it offers the complete time series of official marine fisheries landings from 1950 to present. As this is based on national statistics supplied by each member country (Garibaldi 2012), its quality is dependent on the capacity of data collection within these countries. Due to weak institutional capacity, Dominica is one of the Caribbean islands which struggles with data collection, and therefore can only provide FAO with basic statistical data on its fishery sector. A thorough review of the Dominican fisheries literature (published and unpublished), complemented with local expert knowledge was therefore used to: (1) provide an improved, more realistic, estimate of total marine fisheries catches for Dominica for the period 1950-2010, and (2) improve the taxonomic breakdown of catches.

[2] However FAO FishStat show catches for Dominica beginning in the year 1950.

Methods

A regional nutrition survey by Adams (1992) provided a *per capita* fresh fish consumption rate which was combined with human population data for Dominica to independently reconstruct the likely total local demand for fresh fish from 1950 to 2010. Using tourism statistics on the number of stay-over tourists on the island, we estimated the tourist seafood demand from 1950 to 2010. Thus, combining local and visitor seafood demand we estimated total domestic marine fisheries extractions for Dominica from 1950-2010. Due to the lack of data, no estimate of sport-fishing was undertaken during this study.

Human population, numbers of fishers and tourists

Human population data were extracted from the World Bank database (data.worldbank.org). Data were available for most years, and a linear interpolation was done to estimate the population in years with missing data: 1975, 1976, 1977 and 1979 (see Figure 2). This total human population time-series was then used to estimate the number of fishers (Figure 3). There were 300 part-time fishers in 1960 (Fentem 1960), 1,700 in 1975 (Mitchell and Gold 1983) and 1,800 in 2000 (Sebastien 2002). Direct linear interpolations were used between anchor points to estimate the population of part time fishers from 1960-2000. The ratio of part-time fishers within the total population for the years 1960 and 2000 were calculated and applied to the human population for the periods 1950-1959 and 2001-2010, respectively.

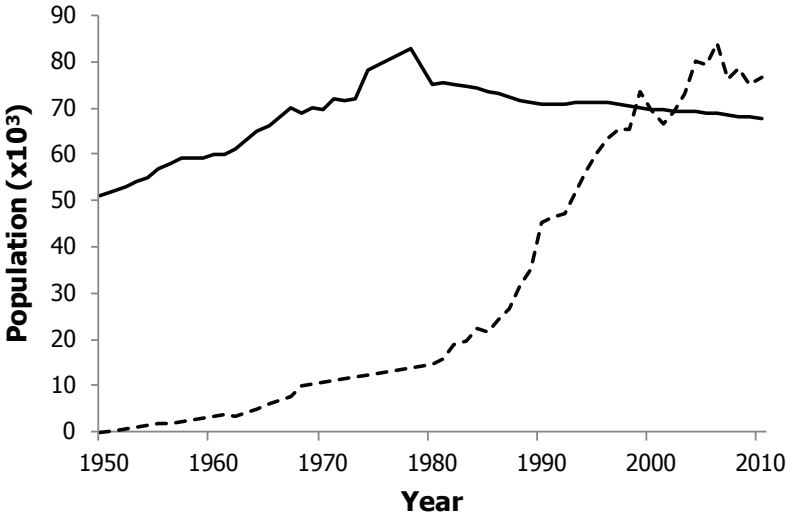

Figure 2. Local Dominican population (solid line) and number of stop-over tourist (dotted line). Note Hurricane David occurred in 1978.

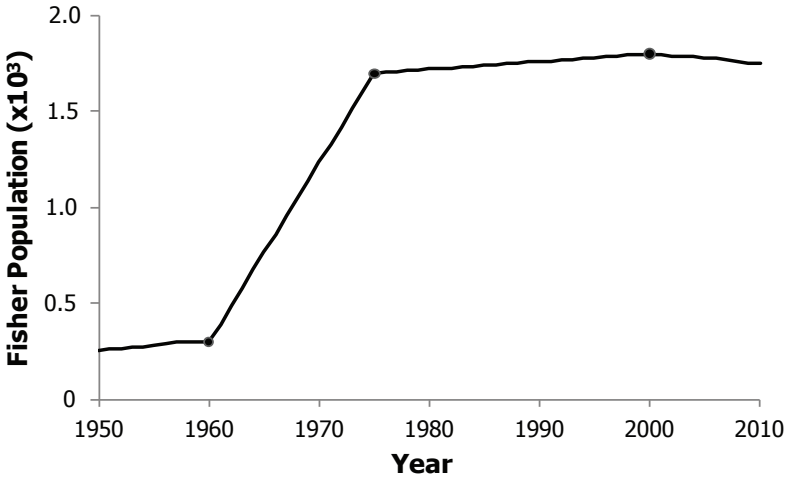

Figure 3. Number of part-time fishers in Dominica during the period 1950-2010. Solid points represent anchor points used for the interpolation (1960 from Fentem 1960; 1975 from Mitchell and Gold 1983; and 2000 from Sebastien 2002).

Data on the number of stop-over tourists (travelers who stay on the island for more than a day) were available from the Caribbean Tourism Organization (www.onecaribbean.org), the Ministry of Tourism in Dominica (tourism.gov.dm) and a case study of tourism and development in the region (Bryden 1973). Data were available for 1961-1962, 1967-1968 and 1980-2010. However we assumed tourism started in 1950, so a direct linear interpolation was done to estimate the tourist population in years with missing data.

Annual tourist population numbers were combined with data on the average length of stay of approximately 7 days (Anon. 2006b). Taken together with inferences about the frequency of seafood consumption (one serving of seafood per day) and a typical round weight serving proportion of 250 grams (determined by J. Adams regional household survey), we applied the following equation to estimate annual tourist seafood demand annually:

Small-scale fisheries

To independently estimate Dominica's total small-scale fisheries catches, we multiplied annual population numbers by 20 kg fish·person^{-1}·year^{-1}, a regional fresh fish consumption rate from (Adams 1992). This consumption rate was derived from 623 randomly surveyed households in Trinidad, Tobago, St. Vincent, St. Lucia and Belize between September 1980 and June 1981. The respondents reported serving a 250 gram portion (round weight) of fish on average 1.7 times weekly. Locally, the Dominica Food and Nutrition Council carried out a national survey of domestic food consumption patterns in 1996. The document was accessed at the local library and only contained data on the frequency of fresh fish consumption, i.e., 45% of Dominicans report eating fresh fish 2-6 times per week (Anon. 2001b). Due to the lack of detailed information in the national study, we used the regional consumption estimate (Adams 1992) and assumed that consumption rates remained constant from 1950 to 2010.

The Fisheries Division indicated that catch data recorded in the national database may include catches from subsistence, artisanal or -more dubiously- recreational[3] sectors, i.e. catch data are not easily distinguishable by sector (Derrick Theophile, pers. comm., Dominica Fisheries Division, February 2012). Thus, we assumed that reported catches consist of a mix of artisanal and subsistence catches. To assign catches to artisanal and subsistence sectors, it was assumed that in 1950, 80% of catches were from the subsistence sector and 20% were from the artisanal sector. In 2010, 50% of catches were attributed to the subsistence sector and 50% to the artisanal sector. A linear interpolation was done between these two years to derive an assignment by sector for the entire 1950-2010 time-period.

Taxonomic composition of catches

Fisheries division data for 2000 provided a breakdown of total landings by 4 fishery types : reef, deep slope, coastal and offshore (Sebastien 2002; Table 1). Based on the regional popularity of the fish pot (Munro 1983; Mahon and Hunte 2001) we assumed that 75% of reef fishery catches were made with fish pots and assigned 25% to catches made by bottom nets. For deep slope fisheries, we assumed 100% of catches were made by lines. Thus, total reconstructed catches were disaggregated by 5 fishery types: pot, net, line, coastal pelagic and offshore pelagic.

Table 1. Status of major fisheries in Dominica with anchor points for disaggregation of catches by fishery type

Fishery type	Percentage contribution (%)[a]	Gear allocation (%)[b]	Anchor points (%)[c]	
			1950	2010
Reef fisheries	16	12 pots	36	12
		4 nets	8	4
Deep slope fisheries	6	6 line	12	6
Coastal pelagic fishery	44	44*	44	34
Offshore pelagic fishery	34	34*	0	44

[a] Based on Sebastien (2002).
[b] Assumed allocation of catch by gear type in 2000 for use in taxonomic breakdown in relation to Guiste *et al.* (1996).
[c] Percentage contribution of each fishery type based on assumptions of gear popularity in each period
* Taxonomic breakdowns for coastal and offshore pelagic catches were not broken down by gear type.

Using our knowledge on gear popularity in Dominica in the earlier and later time period, we derived a breakdown of total landings for 1950 and 2010. Given the popularity of pot fishing, hand lining and beach seining in the earlier time period (Mitchell and Gold 1983) we increased catches by these sectors in 1950, and assumed no offshore fishery was present back then. Therefore for 1950, landings by pot fishery were increased threefold to 36%, landings by nets were doubled to 8%, landings by hand lines were doubled to 12% and coastal pelagic landings were kept constant at 44%. Due to several developmental efforts in the past decade (Sebastien 2002; Anon. 2005), offshore fishing is becoming more prevalent today. Therefore in 2010, offshore pelagic landings were increased by 10% and coastal pelagic landings were decreased by 10%.

Table 2. Taxonomic breakdown (in %) applied to reconstructed catches based on Guiste *et al.* (1996).

Taxon	Common name	Pot	Net	Line	Coastal	Offshore
Acanthuridae	Surgeonfishes	2.00	-	-	-	-
Balistidae	Triggerfishes	3.00	-	9.00	-	9.00
Belonidae	Needlefish	-	-	-	1.00	-
Carangidae	Jacks	-	26.00	-	9.00	-
Carcharhinidae	Sharks	-	4.00	-	-	-
Clupeidae	Sprats	-	-	-	6.00	-
Coryphaenidae	Dolphin fish	-	-	-	-	32.00
Exocotidae	Flyingfish	-	-	-	-	21.00
	Ballyhoo	-	-	-	60.00	-
Haemulidae	Grunts	3.00	25.00	-	-	-
Holocentridae	Squirrelfishes	9.00	12.00	6.00	-	-
Lutjanidae	Snappers	12.00	12.00	45.00	-	-
Mullidae	Goatfishes	8.00	7.00	-	-	-
Muraenidae	Eels	5.00	-	-	-	-
Scaridae	Parrotfishes	8.00	-	-	-	-
Scombridae	Big eye[a]	-	-	-	0.04	0.26
	Blackfin[a]	-	-	-	0.88	5.72
	Skipjack[a]	-	-	-	1.00	6.50
	Tuna like species nei[a]	-	-	-	0.16	1.04
	Yellowfin[a]	-	-	-	1.88	12.22
	Kingfish	-	-	-	-	6.00
	Mackarel	-	-	-	17.00	-
Serranidae	Groupers	17.00	4.00	27.00	-	-
Miscellaneous	Others	33.00	10.00	13.00	5.00	6.00

[a] Guiste *et al.* (1996) provide a single 'tuna' category. The breakdown presented in this table is based on FAO data (1990-2010), i.e., the period for which Dominica reported tuna to FAO.

Thus, three anchor points were established for 1950, 2000 and 2010 (Table 1). Using linear interpolation between 1950, 2000 and 2010, total reconstructed catches were divided into 5 fishery types, mentioned above, for the entire time period. Finally catches were disaggregated to the family level, by applying catch compositions by fishery type from Guiste's island wide fisheries statistical analysis performed from 1990-1992 (Guiste *et al.* 1996) (Table 2).

[3] Recreational catches were briefly assessed by telephone-interviews with 2 of the 3 tour operators operating on the island. Catches from this sector were considered minimal and were therefore not specifically assessed in this study.

Results

Reconstructed small-scale catches from the artisanal sector amounted to approximately 30,300 t over the time period. Reconstructed catches from the subsistence sector in Dominica totaled 54,600 t for the period 1950-2010. Artisanal catches supplying the tourist market totaled 2,272 t for the period 1950-2010. With an average annual catch of 37 t ·year^{-1} supplying this sector for the last decade.

Dominica's reconstructed total fisheries catches for the period 1950-2010 were estimated to be 84,900 t, which is 1.8 times the reported catch of 46,526 t as presented by the FAO on behalf of Dominica (Figure 4a). Reported landings fluctuate between a low of 400 t·year^{-1} and a high of 1500 t·year^{-1} over the period 1950-2010, with average annual reported landings of 765 t·year^{-1}. Total unreported catches for the period 1950-2010 were estimated at 38,415 t, with average annual unreported catches of 629 t·year^{-1}. There were no obvious unreported catches in three years: 1979, 1981 and 1982. The substantial decline in catches in 1979 was the result of damages from Hurricane David in August of that year (Goodwin *et al.* 1985; Anon. 2000, 2008). Thus FAO catch data were accepted as the best representation of total catches that year.

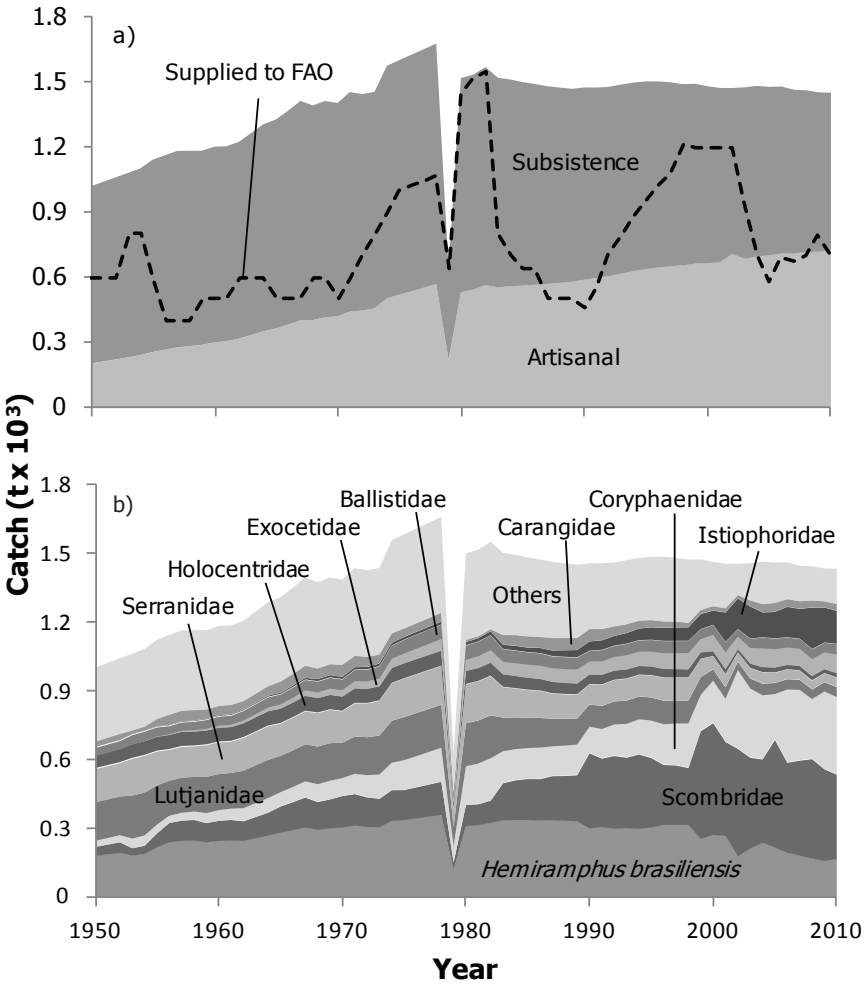

Figure 4. Reconstructed total catch of Dominica, 1950 to 2010; a) by sector with FAO reported landings overlaid as a line graph; and b) by main taxa. Note Hurricane David occurred in 1978.

Fisheries catches of Dominica were dominated by catches of ballyhoo (21% *Hemiramphus brasiliensis*) a small schooling coastal species which is commonly used as bait for catching the larger pelagic (LeGore 2007). Catches of larger migratory pelagics including 'dorado' or dolphin fish (Coryphaenidae 10%) and billfishes (Istiophoridae 5%) were important. Catches of smaller pelagics such as mackerel (Scombridae 14%), flyingfish (Exocotidae 3%) and triggerfish (Balistidae 3%) were also significant. Demersal species were also common, as was demonstrated by the importance of snappers (Lutjanidae 9%), groupers (Serranidae 8%) and squirrelfishes (Holocentridae 3%). The remainder of catches composed of 10 families and other unidentified fish species comprised 22% of the total reconstructed catch (Figure 4b).

Discussion

Traditionally, Dominicans have relied on agriculture and fishing for their food and livelihoods. It is still regarded as one of the least developed islands in the region. Tourism is a major and growing income earner for this small island developing state, and the success of the sector is based on a healthy natural environment which includes a healthy marine ecosystem.

Unfortunately, diminishing returns from agriculture on land in Dominica is transferring pressure to the sea, as is the case in Malthusian overfishing (Pauly 1994). The downturn in the banana industry resulting from Hurricane damage in the 1970s and insecure market prices in the 1990s caused farmers to move into the fishing industry as a primary source of income (Anon. 2006a). This trend possibly began even earlier, as we demonstrated the population of part-time fishers increased by a factor of 5 from 1960 to 1975. As more and more coastal inhabitants look to the sea for improved livelihoods, fishing pressure increases, as does the threat to marine biodiversity.

Dominica's total reconstructed fisheries catches for the period 1950-2010 were estimated to be nearly 85,000 t, which is 1.8 times the officially reported catch. The difference can be attributed to underreporting of small-scale fisheries, from both subsistence and artisanal sectors. This amount is substantial and shows that local fish products contribute significantly to the island's dietary requirements, something that had previously been understated in a market analysis of the sector (Goodwin *et al.* 1985). Though tourism has declined due to the global economic crisis, catches supplying visitors are important and should not be overlooked.

Our reconstruction did not estimate catches made by French fishers in Dominica's EEZ or recreational catches. Historically, the presence of French fishers (from Guadeloupe and Martinique) has been documented, but data on their effort and landings were not available (Mitchell and Gold 1983). Thus, total removals from Dominican waters are likely higher than our reconstructed estimates, which focused only on domestic catches, as foreign catches put additional pressure on local fisheries resources. The reconstruction of Dominica's fisheries can be viewed as an improvement of the data submitted to the FAO in terms of both total catch and taxonomic resolution.

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Appendix Table A1. FAO landings vs. reconstructed total catch (in tonnes), and catch by sector for Dominica, 1950-2010.

Year	FAO landings	Reconstructed total catch	Artisanal	Subsistence
1950	600	1,020	204	816
1951	600	1,040	213	827
1952	600	1,061	223	838
1953	800	1,081	232	849
1954	800	1,101	242	859
1955	600	1,142	257	885
1956	400	1,162	267	895
1957	400	1,183	278	905
1958	400	1,183	284	899
1959	500	1,184	290	894
1960	500	1,203	301	902
1961	500	1,204	307	897
1962	600	1,224	318	906
1963	600	1,265	335	930
1964	600	1,307	353	954
1965	500	1,327	365	962
1966	500	1,368	383	985
1967	500	1,414	403	1,011
1968	600	1,393	404	989
1969	600	1,413	417	996
1970	500	1,403	421	982
1971	600	1,453	443	1,010
1972	700	1,445	448	997
1973	800	1,455	458	997
1974	900	1,575	504	1,071
1975	1,001	1,600	520	1,080
1976	1,024	1,627	537	1,090
1977	1,047	1,651	553	1,098
1978	1,070	1,677	570	1,107
1979	642	642	221	421
1980	1,445	1,518	531	987
1981	1,514	1,534	545	989
1982	1,545	1,569	565	1,004
1983	800	1,520	555	965
1984	700	1,512	559	953
1985	640	1,499	562	937
1986	644	1,491	567	924
1987	500	1,481	570	911
1988	500	1,474	575	899
1989	500	1,469	580	889
1990	458	1,475	590	885
1991	552	1,474	597	877
1992	711	1,478	606	872
1993	794	1,489	618	871
1994	882	1,498	629	869
1995	950	1,503	639	864
1996	1,030	1,503	646	857
1997	1,079	1,499	652	847
1998	1,212	1,491	656	835
1999	1,200	1,492	664	828
2000	1,200	1,480	666	814
2001	1,200	1,473	670	803
2002	1,198	1,472	708	764
2003	950	1,475	686	789
2004	700	1,482	697	785
2005	580	1,478	702	776
2006	694	1,479	710	769
2007	677	1,465	711	754
2008	697	1,462	717	745
2009	790	1,452	719	733
2010	700	1,450	725	725

Appendix Table A2. Reconstructed total catch (in tonnes) by major taxa for Dominica, 1950-2010. 'Others' contain 10 additional taxonomic categories.

Year	Hemiramphidae	Coryphenidae	Lutjanidae	Serranidae	Scombridae	Istiophoridae	*Thunnus* spp.	Holocentridae	Exocoetidae	Balistidae	Other
1950	202	26	168	144	-	32	7	58	-	35	348
1951	208	28	168	144	-	34	9	58	1	36	353
1952	215	30	168	144	1	36	11	59	3	36	358
1953	203	42	187	159	1	22	9	59	4	41	353
1954	210	44	187	159	2	24	11	60	5	41	357
1955	239	38	170	147	3	43	17	61	7	38	379
1956	261	31	152	133	3	60	23	62	8	35	394
1957	267	34	153	134	4	61	25	62	10	36	398
1958	268	36	151	132	4	62	27	61	11	36	395
1959	261	43	157	137	5	54	27	60	13	38	388
1960	267	46	157	137	5	56	29	61	14	39	391
1961	268	49	155	135	6	56	31	60	16	39	389
1962	267	56	163	142	6	50	32	60	17	41	388
1963	279	60	164	143	7	54	35	62	19	42	399
1964	290	64	166	145	8	58	38	63	22	44	410
1965	303	62	158	139	9	68	43	63	24	43	418
1966	314	65	159	140	10	71	46	64	26	44	428
1967	326	70	161	142	11	75	50	65	28	45	439
1968	315	77	164	144	12	68	50	63	30	46	423
1969	322	80	163	144	13	70	53	63	32	47	427
1970	326	78	153	135	13	77	56	62	33	46	424
1971	334	88	162	143	14	74	59	63	36	49	433
1972	328	96	165	145	15	66	59	62	37	50	422
1973	327	105	169	149	16	59	59	62	39	52	418
1974	354	119	182	161	17	61	66	66	45	57	448
1975	358	129	187	166	18	56	68	66	47	59	448
1976	366	135	187	166	19	56	71	66	50	60	451
1977	373	141	187	166	20	57	75	66	53	61	454
1978	381	147	187	167	21	57	78	66	55	62	457
1979	140	72	83	74	6	-	27	25	22	27	166
1980	332	168	186	168	20	17	67	57	54	62	388
1981	336	176	187	169	22	14	69	57	56	63	386
1982	346	184	186	169	24	17	73	57	59	64	391
1983	357	139	145	131	24	70	84	55	59	55	401
1984	359	135	137	124	25	79	87	54	60	54	398
1985	358	133	132	118	25	82	90	52	61	53	393
1986	357	136	128	116	27	84	91	51	63	53	386
1987	357	129	119	107	28	93	95	50	64	52	387
1988	355	131	116	105	31	97	96	49	65	51	380
1989	353	133	113	102	36	99	97	47	66	51	373
1990	321	114	96	86	169	107	92	42	61	45	341
1991	328	127	100	90	138	107	94	42	64	48	336
1992	320	136	100	91	172	96	91	40	64	48	321
1993	324	146	101	93	166	94	93	40	66	49	318
1994	319	151	99	92	191	92	92	38	67	49	308
1995	326	162	100	94	172	90	94	38	69	50	308
1996	337	175	102	98	135	86	97	38	73	52	310
1997	337	181	100	96	136	84	97	37	74	52	304
1998	337	193	99	98	136	73	96	36	75	52	295
1999	275	156	77	76	374	81	81	28	62	42	239
2000	294	182	49	55	375	77	97	21	76	42	212
2001	288	185	49	55	295	142	101	21	79	43	213
2002	200	341	35	38	380	147	75	15	58	32	152
2003	233	299	43	43	269	171	97	19	73	40	189
2004	259	277	50	47	199	155	117	22	86	47	222
2005	238	198	48	43	300	167	117	22	85	46	216
2006	215	317	44	40	239	177	109	20	80	43	195
2007	203	306	43	39	261	174	108	19	80	43	189
2008	190	259	41	37	285	222	107	19	79	42	181
2009	180	337	40	37	262	187	104	18	78	41	171
2010	187	336	43	39	216	183	114	19	85	45	184