Reconstruction of the Republic of the Marshall Islands fisheries catches: 1950-2010[1]

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Abstract

Reconstructed total catches of the Republic of the Marshall Islands were estimated to be approximately 661,500 t over the 1950-2010 time period, which is 37% higher than the 483,364 t reported by the FAO on behalf of the Marshall Islands. The people of the Marshall Islands have been dependent on subsistence fisheries throughout their history. The subsistence sector contributes 78% (i.e., 116,800 t) to small-scale catches, with the remaining 33,800 t being artisanal (i.e., small-scale commercial). Large-scale commercial (i.e., industrial) fisheries for large pelagic species have only developed in the last decade, but still contribute 77% (i.e., 510,900 t) of the total catch for the 1950-2010 period considered here. This clearly highlights the substantial impact that large-scale fisheries may have on marine resources, and illustrates the need for effective fisheries management in order to ensure food security for the local population of the Marshall Islands.

Introduction

The Republic of the Marshall Islands (RMI) is located in the western Pacific, just west of the International Date Line and north of the Equator. It has a land area of only about 180 km² scattered over 1.2 million km² of ocean, and is a small Micronesian nation comprised of 29 atolls (24 of which are inhabited) and five single islands, which form two parallel groups: the 'Ratak' (sunrise) chain and the 'Ralik' (sunset) chain.[2] Two-thirds of the country's population of 67,180 live in the two major centers of Majuro and Ebeye. The outer islands have few inhabitants due to scarcity of employment and lack of economic development.[3]

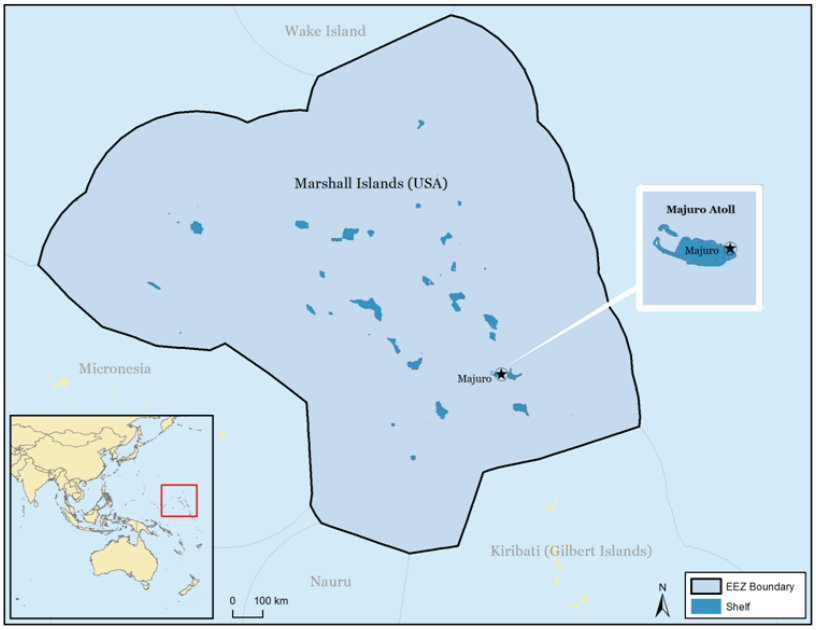

Figure 1. The Republic of the Marshall Islands in the western Pacific, its extensive Exclusive Economic Zone (EEZ) and shelf areas of less than 200 m depth.

The dates and origins of the first settlers to arrive in the Marshalls are uncertain. It is commonly believed that the first colonists to arrive were Micronesian navigators who called them the 'Aelon Kein Ad' (Our Islands).[2] Archeological finds on Bikini Atoll in the 1980s were carbon dated to 2000 years BC, indicating that people may have settled the Marshalls as far back as 4,000 years ago.[2] The RMI has been colonized by a succession of foreign countries. The first Spanish explorer, Alvaro Saavedra arrived in 1529. In 1788, British Naval Captain William Marshall sailed through the area while transporting convicts to Australia, and the area now known as the RMI was given its name for this captain. The RMI was governed by Germany in the late 1800s, before being captured by Japan at the onset of WWI, who were granted a mandate to rule by the League of Nations. The RMI was occupied by the Allies in 1944, and became one of six entities in the Trust Territory of the Pacific Islands (TTPI) established by the United Nations, with the United States as the Trustee.[2]

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[2] Embassy of the Republic of the Marshall Islands, Washington D.C. (2008) History [online]. Available from: http://www.rmiembassyus.org/History.htm [accessed 9 May, 2013].

[3] USAID – Pacific Islands (2013) Marshall Islands [online]. Available from: http://pacificislands.usaid.gov/country/marshall-islands [accessed 9 May, 2013].

From 1946 to 1958, the RMI served as the site of the Pacific Proving Grounds where the U.S. tested 67 nuclear weapons, including the largest test the U.S. ever conducted, code named Castle Bravo.[4] It was the first U.S. test of a dry fuel thermonuclear hydrogen bomb detonated on March 1, 1954 at Bikini Atoll with an anticipated yield of four to six megatons. However, Castle Bravo detonated with a yield of 15 megatons. Combined with other factors, this led to the most significant accidental radioactive contamination ever caused by the United States. In 1956, the Atomic Energy Commission regarded the Marshall Islands as "by far the most contaminated place in the world" (Cooke 2009, page 168). Health and damage claims resulting from nuclear testing in the Marshall Islands are ongoing, and health effects from these nuclear tests linger. From 1956 to August 1998, at least $759 million was paid to the Marshallese Islanders in compensation for their exposure to U.S. nuclear testing (Schwartz 1998).

In 1979, the Government of the Marshall Islands was officially established and the country became self-governing. In 1986, the Compact of Free Association with the United States granted the Republic of the Marshall Islands (RMI) its sovereignty.[5] The Compact provides for development aid in the form of annual grants and U.S. defense of the islands in exchange for continued U.S. military use of the Ronald Reagan Ballistic Missile Defense Test Site at Kwajalein Atoll (Smith 1992). The independence procedure was formally completed under international law in 1990, when the UN officially ended the Trusteeship status.[6] Government assistance from the U.S. is the mainstay of the economy.

The Marshallese culture, or *manit* is central to the way of life in the islands. As members of a clan (*jowi*), all people have right to land; however, the chief *(iroij*) has control over the use, distribution and tenure, in addition to settlements of disputes over the resources. Marshallese culture is matrilineal, meaning that assets, land and resources are passed down through the mother's side of the family.[7]

Fish is the primary protein source of sustenance in the Marshall Islands, as the land only lends itself to the most marginal agricultural crops: breadfruit, pandanus, swamp tare, and coconut.[6] Fish and other marine resources were traditionally caught using narrow canoes with an outrigger to one side. The hulls were made from breadfruit wood, while the sails were woven from pandanus leaves. A one-man canoe which would typically be used to fish inside a lagoon was known as '*tipnol*', while the largest canoes known as '*walap*' were over 30 m in length, could carry forty people, and could sustain ocean voyages of up to one month.[7]

In addition to Marshallese boats, fishing vessels from other Pacific island states as well as Japan, Korea, Taiwan and China operate in the EEZ of the Marshall Islands.[8] The United States also fishes in the waters of the EEZ of the Marshall Islands under an agreement known as the 'US Multilateral [Tuna] Treaty'.[8,9]

The key agency responsible for the examination, development, regulation and administration of marine resource use in the RMI is the Marshall Islands Marine Resources Authority (MIMRA). The National Environmental Protection Authority, Marshall Islands Development Authority, Kwajalein Atoll Development Authority, and the local authorities also play important roles in the marine resources sector. Eliminating overlaps in jurisdiction is needed to avoid potential management problems (Smith 1992).

Almost all of the domestic fisheries in the Marshall Islands are of subsistence nature, except for artisanal (i.e., small-scale commercial) activities around the urban centers of Majuro, Kwajalein and Arno. Capture methods are varied, and both traditional and modern methods are utilized. Commonly used methods include: handlining, spearfishing, gillnetting, trolling and cast-netting. Most artisanal fishing is conducted in wooden or fibreglass boats of 15 to 20 feet length powered by outboard motors under 30 hp. Occasionally larger motors of 70 hp or more are used when fishing takes place from urban centers, but outside the atolls (Smith 1992). In the outer atolls, small paddling canoes remain the most common fishing vessels for subsistence fishing.

The importance of the fisheries sector, both to the daily lives and basic food security of the Marshallese, and for economic development of the country and region, is evidently clear. With this in mind, understanding the historical patterns and trends in total catches is fundamental and critical to understanding and managing their future (Pauly 1998). The objective of the present study is to provide a time series baseline by estimating the total catches taken domestically in the RMI from 1950 to 2010 using a catch reconstruction approach as outlined by Zeller *et al.* (2007).

Methods

Data presented by the Food and Agriculture Organization of the United Nations (FAO) on behalf of the Republic of the Marshall Islands (RMI) were obtained from the FishStat capture production database for FAO area 71. Using information presented by Gillett (2009), and following the reconstruction approach described by Zeller *et al.* (2007), we estimated demand for locally-sourced seafood, and compared this to the portion of FAO landings considered to remain in-country for domestic consumption in order to determine missing (i.e., unreported) catch amounts.

[4] Embassy of the Republic of the Marshall Islands, Washington D.C. (2008) Nuclear Issues [online]. Available from: http://www.rmiembassyus.org/Nuclear%20Issues.htm#Chronology [accessed 9 May, 2013].

[5] CIA World Fact Book (2012) Marshall Islands [online]. Available from: https://www.cia.gov/library/publications/the-world-factbook/geos/rm.html [accessed 4 December, 2012].

[6] Embassy of the Republic of the Marshall Islands (2008) Compact of free association [online]. Available from: http://www.rmiembassyus.org/RMI-US%20Compact.htm [accessed 4 December, 2012].

[7] Embassy of the Republic of the Marshall Islands, Washington D.C. (2008) Culture [online]. Available from: http://www.rmiembassyus.org/Culture.htm [accessed 9 May, 2013].

[8] Embassy of the Republic of the Marshall Islands, Washington D.C. (2008) Economy [online]. Available from: http://www.rmiembassyus.org/Economy.htm

[9] Pacific Islands Forum Fisheries Agency (2008) US Treaty [online]. Available from: http://www.ffa.int/usa_pi_treaty#attachments [accessed 20 November, 2012].

Artisanal and subsistence fisheries

For the purposes of this report, small-scale catches are defined as being attributed to one of two sectors: artisanal or subsistence. Artisanal fisheries catches are defined as those catches which are made by small vessels in inshore coastal waters and are for commercial sale for local consumption. Subsistence fisheries are defined as those being made by small vessels in inshore coastal waters, but with the main purpose and intent of self- and family-consumption rather than sale as the primary driver (Gillett 2011b).

For the purposes of this reconstruction, we determined that all reported catches which were not large pelagic tunas or billfishes, were attributed to the small-scale sector. This includes various invertebrates and 'marine fishes nei'.

Small-scale sector

We used the anchor point in Gillett (2009) of 950 t of artisanal catch in 2005, and assumed artisanal (i.e., commercial) fishing started post WWII with a start of zero tonnes in 1945. We interpolated linearly between 1945 and 2005. For 2005-2010, we extrapolated and carried forward the same interpolation rate used between 1945 and 2005 (Table 1).

Table 1. Anchor points used to determine artisanal catch.

Year	Artisanal catch (t)	Source
1945	0	Assumption
1945-2004	-	Interpolation
2005	950	Gillett (2009)
2006-2010	-	Extrapolated (interpolation rate from 1945-2004 carried forward)

For subsistence, we used the 2005 subsistence production anchor point of 2,800 t in Gillett (2009), and converted this to a *per capita* subsistence rate of consumption for 2005 (i.e., 53.8 kg·person^{-1}·year^{-1}). For 1950, we assumed a *per capita* subsistence rate of consumption that was 25% higher (i.e., 67.25 kg·person^{-1}·year^{-1}) than in 2005, and interpolated linearly between these points (Table 2). This interpolation rate was carried forward in order to extrapolate to 2010. We then multiplied these derived, annual consumption rates by the annual human population of the RMI to derive an amount in tonnes of local fish being consumed for subsistence purposes.

Table 2. Anchor points used to determine local consumption rates used in the reconstruction of the subsistence sector.

Year	*Per capita* consumption rate (kg·person^{-1}·year)$^{-1}$	Source
1950	67.3	Assumption
1951-2004	-	Interpolation
2005	53.8	Gillett (2009)
2006-2010	-	Extrapolated (interpolation rate from 1950-2004 carried forward)

We used information from Dalzell *et al.* (1996) and Gillett (2011b) to derive a taxonomic breakdown of the artisanal and subsistence catches. This breakdown was applied to the reported catches labelled as 'marine fish nei', and the unreported subsistence and unreported artisanal catches as estimated here.

Aquarium trade

Catches of reef fish for the global aquarium trade are noteworthy in the Marshall Islands, and represent an important source of income of almost USD 400,000 in 2006 (Gillett 2009). The species being targeted are diverse; over 50 different species are taken (Gillett 2011b), and they are typically smaller than those targeted for food. They tend to come from the families Pomacanthidae, Chaetodontidae, Acanthuridae, Labridae, Serranidae, Pomacentridae, Balistidae, Cirrhitidae, Gobiidae and Blenniidae (Dalzell *et al.* 1996), and the most commonly taken fish is the flame angel (*Centropyge loriculus*) (Gillett 2011b). This fishery operates largely from the Majuro lagoon, and Gillett (2011b) estimates that approximately 3,000 fish are exported each week. Marine animals from the aquarium trade are not estimated as part of this reconstruction, as our focus is on food fisheries; however, the amounts could be substantial in terms of number of fish, though not in terms of tonnage.

Large-scale sector

Large-scale or industrial fisheries in the RMI typically take place in offshore waters, and are responsible for much greater tonnages than small-scale operations. They are conducted by Marshallese owned and operated vessels, or by foreign-owned vessels, and focus their efforts on tuna and other large pelagic species (Gillett 2011b). The locally-based RMI offshore fleet consists to 75% of purse seine vessels, with the remaining 25% being longline vessels (Gillett 2011b).We attributed all reported catches of tunas and other large pelagic species such as billfishes to the large-scale sector.

By-catch and discards

The industrial fleet in the RMI targets mainly four commercial tuna species: skipjack (*Katsuwonus pelamis*), albacore (*Thunnus alalunga*), bigeye (*T. obesus*) and yellowfin (*T. albacares*). However, other large pelagic species such as sharks and billfish are also inadvertently captured. Often, because billfishes are valuable and exportable, they are reported in data supplied to the FAO, while many other species are not (e.g., sharks). To estimate the amount of this non-targeted by-catch taken by the domestic industrial fleets in the RMI, we first separated the fleet by gear

type. Based on information in Gillett (2011b), we attributed 75% of all catches of the four tuna species to the purse seine fleet, and 25% to the longline fleet. Using anchor points from Gillett (2009), we increased all purse seine catches by 5%, and all longline catches by 30%. We then compared this reconstructed offshore catch to the tonnages of tunas and billfishes reported by the FAO on behalf of the RMI to derive any missing (i.e., unreported) by-catch.

The taxonomic composition of this unreported by-catch was derived using data in MIMRA (2009), which details the non-target species caught in the locally-based offshore fleet (Table 3). The top 15 species by weight for the year 2008 were identified by the percentage of the by-catch reported by MIMRA, and these percentages were applied to the unreported by-catch.

Table 3. By-catch of pelagic species in the large-scale sector, based on MIMRA (2009).

Common name	Taxon name	% attributed to by-catch
Blue marlin	*Makaira mazara*	7.90
Black marlin	*Istiompax indica*	0.33
Striped marlin	*Kajikia audax*	4.20
Swordfish	*Xiphias gladius*	1.00
Other billfish	Istiophoridae	1.30
Blue shark	*Prionace glauca*	10.50
Mako shark	*Isurus oxyrinchus*	1.10
Oceanic whitetip shark	*Carcharhinus longimanus*	5.00
Silky shark	*Carcharhinus falciformis*	21.90
Other sharks/rays	Elasmobranchii	36.90
Rainbow runner	*Elegatis bipinnulata*	1.67
Wahoo	*Acanthocybium solandri*	3.50
Common dolphinfish	*Coryphaena hippurus*	2.70
Triggerfish	Balistidae	0.25
Opah	*Lampris guttatus*	1.70

Although by-catch is taken in the RMI's locally-based offshore fleet, it is unlikely that much of it is discarded. As Gillett (2011a) notes, discarding from fisheries in the Pacific Islands rarely occurs because all of the catch is seen to have economic value. We therefore assumed no discarding of by-catch in the domestic large-scale fishery (discarding patterns may be substantially different in foreign owned fleets, not covered here).

Results

Our reconstructed total catch for the RMI summed to approximately 661,500 t over the 1950-2010 time period. This is 37% higher than the 483,364 t reported by the FAO on behalf of the RMI for the same time period (Figure 2). Overall, the industrial sector contributed almost 510,900 t, or over 77% of total catches (Figure 2a), while the artisanal and subsistence sectors contributed 33,800 t and 116,800 t, respectively (Figure 2b). Unreported artisanal and subsistence fishing accounted for over 15,800 t and 111,000 t, respectively, and unreported by-catch in the industrial (large-scale) sector accounted for almost 51,300 t (Figure 2a). When examining the small-scale sectors only, the reconstructed total artisanal and subsistence catches are 6.3 times the amount of small-scale catches reported by the FAO on behalf of the Marshall Islands (Figure 2b).

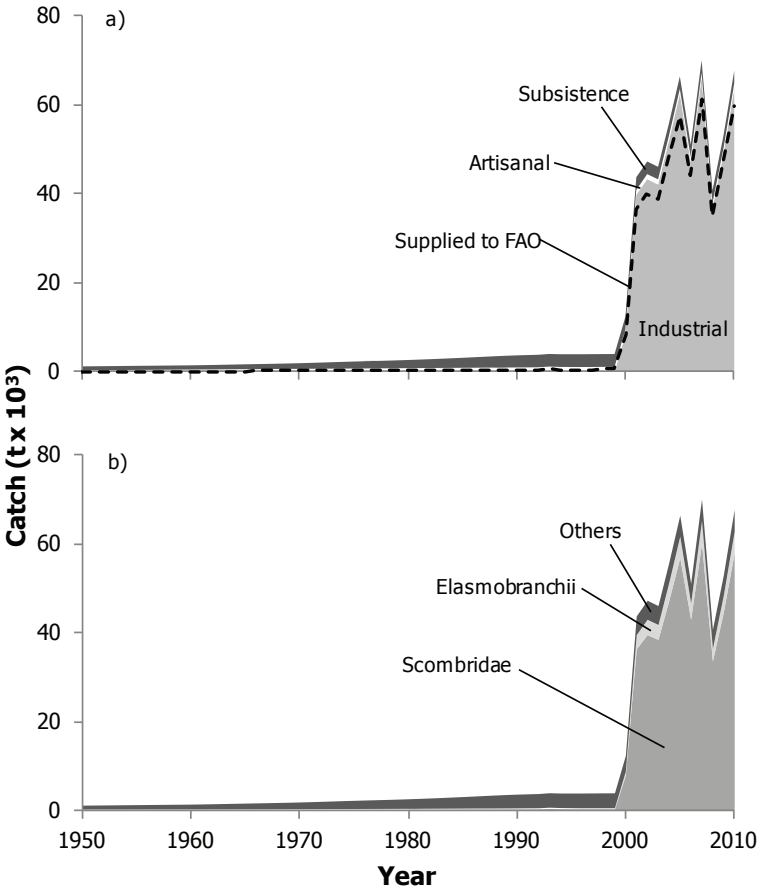

Figure 2. Reconstructed total catch of the Republic of the Marshall Islands, for the time period 1950-2010. a) by sector with data supplied to FAO overlad as line graph; and b) by taxonomic composition, 'others' represents 56 other taxonomic categories.

Overall, fishes from the family Scombridae comprised the greatest portion (72%) of the total reconstructed catch, with skipjack tuna (*Katsuwonus pelamis*) comprising 88% of this family (Figure 3a). Carcharhinidae and other sharks and rays also comprised noteworthy amounts of the reconstructed catch, at just over 38,000 t over the time period. These catches were largely due to by-catch in the domestic industrial large pelagic fisheries.

When examining the taxonomic composition of the small-scale sector separately, invertebrates account for a large portion of this sector, over 38,000 t (25%), which was comprised of giant clam (*Tridacna maxima*), bear's paw clam (*Hippopus hippopus*), scaly or flute clam (*T. squamosa*), *Turbo* species of snails, *Octopus* species, and other miscellaneous invertebrates (Figure 3b). Lethrinidae and Scombridae were two other families which figured prominently in the small-scale reconstructed catch, at 17,000 t and 15,000 t, respectively. The Scombridae family in the small-scale catch is 40% yellowfin (*Thunnus albacares*), 40% skipjack tuna (*K. pelamis*), and 20% other scombrids.

Discussion

The reconstructed total catch for the Republic of the Marshall Islands is estimated to be 37% higher than the landings reported by the FAO on behalf of the Marshall Islands. However, if one excludes the domestic, industrial fisheries for large pelagics from this examination, the total small-scale coastal fisheries catches as reconstructed here were found to be 6.3 times the data reported by FAO on behalf of the RMI. This is largely due to the unreported catches in the subsistence sector, which are difficult to monitor because of the widely dispersed nature of landings sites in the islands. The rapid development and deployment of the locally-based offshore tuna fishery (FAO 2009) at the turn of the millennium is evident (Figure 2a), and appears to have been accompanied by a dramatic improvement in reporting for the industrial sector.

Recreational fishing is generally not carried out by the inhabitants of the islands, but rather is an activity enjoyed by tourists to the islands. The RMI has approximately 25 charter boats based in the capital of Majuro, and another ten boats in Kwajalein and Arno (Gillett 2011b), and the Marshall's Billfish Club has hosted annual tournaments since 1982. As catch estimates are not readily available for this sector, it was not possible to derive estimates of the amount of fish taken by recreational fishers in the RMI; however, this should still been seen as a contribution to the overall marine harvests of the RMI, and accounted for in turn. Any tendency towards catch and release needs to consider potential post-release mortality rates of billfishes.

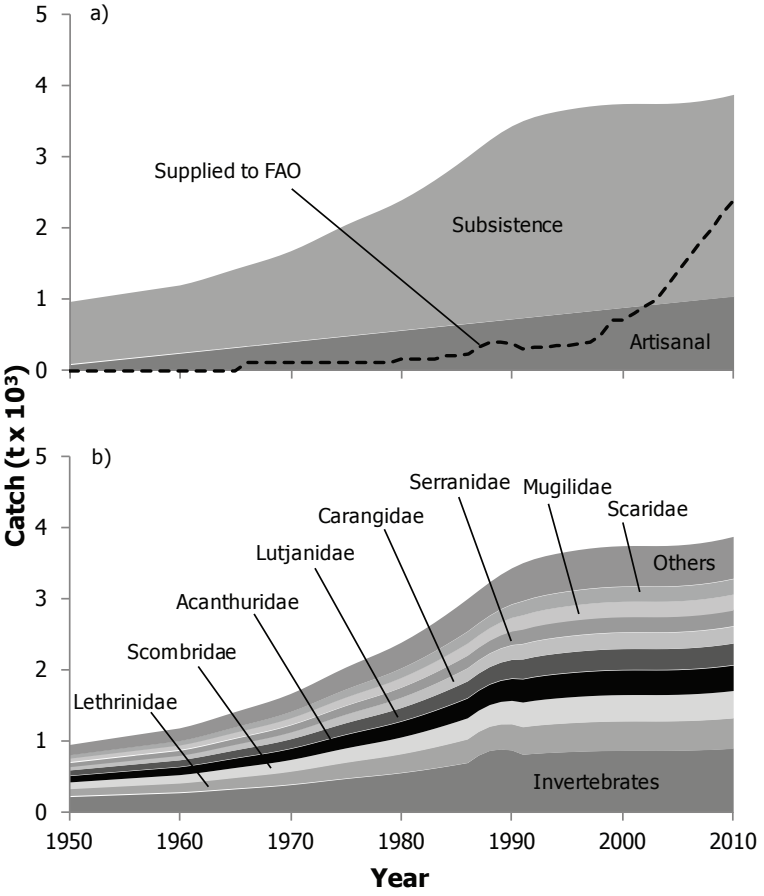

Figure 3. Reconstructed total small-scale catches for the Republic of the Marshall Islands, for the time period 1950-2010, a) by sector, catches 'supplied to FAO' overlaid as line graph (reported landings excluding reported large pelagic tunas and billfishes, which are targeted specifically by the large-scale industrial sector, and thus represent only those catches reported from the small-scale sector); and b) by family. 'Others' represents 22 families.

Foreign industrial fleets from the United States of America and Asian and Pacific island countries and territories are granted access to the EEZ waters of the RMI through the *Multilateral Treaty on Fisheries Between Certain Governments of the Pacific Island States and the Government of the United States of America*, also known as the US Treaty[8] (or the US Multilateral [Tuna] Treaty). However, catches in the RMI from the US and other Pacific islands countries are relatively small compared with those taken by Asian countries such as Japan, Korea and China. As of 2008, the RMI had bilateral agreements with these three Asian countries, as well as New Zealand, to fish the waters of the RMI (MIMRA 2009). The foreign industrial fleets consist mainly of purse seine vessels, some pole-and-line vessels, and comparatively few longline vessels. While the locally-based offshore fishery landed relatively small catches from 1970-1995 (on average 100 t), there was a sudden suspension of catches from 1996-1999. This is potentially due to the experimental fisheries which were being conducted to determine their potential prior to full-scale investment in the projects (Gillett 2007).

The access fees paid by foreign countries to fish in the waters of many Pacific island countries provide much needed foreign exchange income for the countries which receive them. In 2005, 2006 and 2007, the RMI received USD 2.65 million, 2.79 million and 1.9 million, respectively from these distant-water fishing countries for the access granted to the RMI's EEZ (Gillett 2009). Because the foreign-based catches are landed in foreign ports (mainly in Asia or the US) or are transshipped in Majuro (FAO 2009), they are assumed to be accounted for in the FAO fisheries landing reported by those foreign countries, and are therefore not included in this reconstruction of the Marshall Islands catches.

The RMI currently has an observer program in place to carry out the monitoring of the domestic large-scale fleet. With the support of the Secretariat of the Pacific Community (SPC) Oceanic Fisheries Programme, the observer program had nine observers with a total of 1,058 days at sea in 2005, and there were 26 active observers in 2006 (Muller 2006). As noted in our estimates of by-catch from the large-scale offshore fleets, many species are not reported in the FAO figures as being caught. One group of fishes in particular, the cartilaginous fishes (sharks, skates, and rays), are not well documented in FAO reported landings; however, frozen sharks and shark fin is documented frequently in national catch data (MIMRA 2009) and export data for the RMI (Gillett and Lightfoot 2002; Muller 2006; Gillett 2009). Our reconstructed estimates show that the amount of these fishes caught annually is noteworthy, and requires monitoring and reporting. Although the Marshall Islands have a plan of action for managing sharks in tuna fisheries, as of 2009, those plans had not yet been implemented (Gillett 2011a).

As we have seen from the results of this reconstruction work, accurate reporting and monitoring of fisheries is crucial for assessing the state of marine resources. Hanich *et al.* (2010) note some of the threats that management of Pacific island fisheries face due to lack of accurate data: increasing the level of uncertainty already intrinsic to fisheries management, and undermining the ability of Pacific islands to take stock of and develop the economic opportunities presented by the resource. While Kronen *et al.* (2012) found that the Marshall Islands were still displaying a positive balance in its reef productivity in relation to its annual artisanal catch, they note that "the risk of contemporary unsustainable artisanal fin fisheries in PICTs is high and widespread". This report also demonstrates the need to monitor or periodically estimate comprehensively small-scale artisanal and subsistence fisheries (see Zeller *et al.* 2007) to ensure that this risk is managed appropriately.

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Appendix Table A1. FAO landings vs. reconstructed total catch (in tonnes), and catch by sector with discards shown separately for the Republic of Marshall Islands, 1950-2010.

Year	FAO landings	Reconstructed total catch	Industrial	Artisanal	Subsistence
1950	0.25	954	-	79	874
1951	0.25	977	-	95	882
1952	0.25	1,001	-	111	890
1953	0.25	1,025	-	127	898
1954	0.25	1,048	-	143	906
1955	0.25	1,072	-	158	913
1956	0.25	1,095	-	174	921
1957	0.25	1,118	-	190	928
1958	0.25	1,142	-	206	936
1959	0.25	1,165	-	222	943
1960	0.25	1,188	-	238	950
1961	0.25	1,225	-	253	972
1962	0.25	1,269	-	269	1,000
1963	0.25	1,317	-	285	1,032
1964	0.25	1,367	-	301	1,066
1965	0.25	1,416	-	317	1,099
1966	100.00	1,463	-	333	1,130
1967	100.00	1,509	-	348	1,160
1968	100.00	1,556	-	364	1,192
1969	100.00	1,609	-	380	1,229
1970	101.25	1,669	1	396	1,272
1971	101.25	1,736	1	412	1,324
1972	101.25	1,810	1	428	1,382
1973	101.25	1,889	1	443	1,445
1974	101.25	1,966	1	459	1,506
1975	101.25	2,040	1	475	1,564
1976	101.25	2,108	1	491	1,617
1977	101.25	2,173	1	507	1,666
1978	101.25	2,239	1	523	1,715
1979	101.25	2,309	1	538	1,770
1980	151.25	2,387	1	554	1,832
1981	151.25	2,474	1	570	1,903
1982	161.25	2,567	1	586	1,981
1983	161.25	2,667	1	602	2,065
1984	201.25	2,773	1	618	2,155
1985	201.25	2,884	1	633	2,250
1986	221.25	2,999	1	649	2,350
1987	321.25	3,119	1	665	2,453
1988	401.25	3,235	1	681	2,554
1989	396.25	3,341	1	697	2,644
1990	381.25	3,431	1	713	2,718
1991	301.50	3,503	1	728	2,774
1992	330.00	3,568	10	744	2,813
1993	489.00	3,752	153	760	2,839
1994	389.00	3,686	53	776	2,857
1995	376.00	3,686	25	792	2,869
1996	370.00	3,686	-	808	2,878
1997	401.00	3,706	-	823	2,883
1998	501.00	3,722	-	839	2,883
1999	701.00	3,734	-	855	2,879
2000	8,261.50	12,151	8,411	871	2,870
2001	36,581.50	43,541	39,799	887	2,856
2002	39,859.50	47,076	43,334	903	2,840
2003	38,886.25	45,878	42,137	918	2,823
2004	47,887.25	55,670	51,927	934	2,809
2005	57,583.00	66,232	62,482	950	2,800
2006	43,974.00	50,876	47,113	966	2,797
2007	61,229.00	69,872	66,091	982	2,799
2008	35,102.00	40,530	36,726	998	2,807
2009	46,246.25	52,754	48,920	1,013	2,821
2010	59,730.25	67,534	63,663	1,029	2,842

Appendix Table A2. Reconstructed total catch (in tonnes) by major taxa for the Republic of Marshall Islands, 1950-2010. 'Others' contain 32 additional taxonomic categories.

Year	Scombridae	Elasmobranchii	Invertebrates[1]	Lethrinidae	Acanthuridae	Lutjanidae	Carangidae	Others
1950	95	-	219	108	89	74	58	310
1951	98	-	225	110	91	76	60	318
1952	100	-	230	113	93	78	61	325
1953	102	-	236	116	95	80	63	333
1954	105	-	241	118	97	82	64	341
1955	107	-	246	121	100	84	65	348
1956	110	-	252	124	102	85	67	356
1957	112	-	257	126	104	87	68	364
1958	114	-	263	129	106	89	70	371
1959	116	-	268	132	108	91	71	379
1960	119	-	273	134	110	93	72	386
1961	123	-	282	138	114	96	75	398
1962	127	-	292	143	118	99	77	413
1963	132	-	303	149	122	103	80	428
1964	137	-	314	154	127	107	83	444
1965	142	-	326	160	132	110	86	460
1966	146	-	336	165	136	114	89	476
1967	151	-	347	170	140	118	92	490
1968	156	-	358	176	145	121	95	506
1969	161	-	370	182	149	125	98	523
1970	167	-	384	188	155	130	102	542
1971	174	-	400	196	161	135	106	564
1972	181	-	417	204	168	141	110	588
1973	189	-	435	213	175	147	115	614
1974	197	-	453	222	182	153	120	639
1975	204	-	470	230	189	159	124	663
1976	211	-	485	238	196	164	129	685
1977	218	-	500	245	202	169	132	706
1978	224	-	515	253	208	174	136	727
1979	231	-	531	261	214	180	141	750
1980	239	-	549	270	222	186	146	776
1981	248	-	569	279	230	193	151	804
1982	257	-	591	290	238	200	157	834
1983	267	-	614	301	248	208	163	867
1984	278	-	638	313	257	216	169	901
1985	289	-	664	326	268	225	176	937
1986	300	-	690	339	279	234	183	975
1987	302	-	795	341	280	235	184	981
1988	309	-	860	348	287	240	188	1,003
1989	320	-	881	361	297	249	195	1,039
1990	333	-	867	376	309	260	203	1,082
1991	351	-	806	396	325	273	214	1,138
1992	365	1	819	402	330	277	217	1,156
1993	497	-	829	407	334	281	220	1,186
1994	411	4	836	410	337	283	222	1,182
1995	388	-	843	414	340	285	223	1,193
1996	368	-	848	416	342	287	225	1,198
1997	371	-	853	419	344	289	226	1,205
1998	372	-	857	421	346	290	227	1,210
1999	373	-	860	422	347	291	228	1,214
2000	7,964	640	861	423	347	292	242	1,382
2001	36,289	3029	861	423	348	292	295	2,004
2002	39,479	3299	861	423	348	292	301	2,074
2003	38,399	3205	861	423	347	292	299	2,052
2004	47,234	3951	861	423	348	292	316	2,246
2005	56,760	4750	863	424	348	292	334	2,463
2006	42,891	3573	865	425	349	293	309	2,170
2007	60,019	5023	869	427	351	295	342	2,545
2008	33,519	2732	875	430	353	297	292	2,032
2009	44,527	3675	882	433	356	299	315	2,268
2010	57,834	4775	890	437	359	302	342	2,595

[1] Invertebrates includes *Scylla serrata*, natantian decapods, *Trochus* spp., spiny lobsters (*Panulirus* spp.), *Tridacna* spp., *Hippopus hippopus, Asaphis violascens*, *Turbo* spp. and *Octopus* spp.