THE FISHERIES OF ST HELENA AND ITS DEPENDENCIES[1]

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ABSTRACT

The island of St. Helena and its two dependencies (Ascension and Tristan da Cunha Islands) are the most isolated populated islands in the world. As such, the people of these islands have always fished the waters around these islands, yet global fisheries catch statistics do not adequately describe the catch taken in these waters since they are only reliable for the commercial sector, which only began in earnest during the 1970s. Presented here are estimates of total fisheries catches for all three islands for the period from 1950-2006, which include estimates of small-scale catches, commercial catches, and Illegal, Unreported and Unregulated (IUU) catches. From 1950-2006, total fisheries catches for the three islands were estimated to be over 73,000 tonnes, which is 1.8 times larger than data presented in FAO fisheries statistics for the same time period. The largest contributors to the differences were the inclusion of estimates for the small-scale catches taken over the entire time period, and the improved estimate of commercial lobster catches from 1950-1970.

INTRODUCTION

St Helena, a UK overseas territory most famous for being Napoleon's last place of exile, is a small, isolated island in the South Atlantic Ocean that has two dependencies— Tristan da Cunha and Ascension Island (Figure 1). Tristan da Cunha has 5 neighboring islands that comprise the Tristan da Cunha group, two of which, Gough and Inaccessible, are World Heritage Sites. The islands are sparsely populated, with a current population estimate of approximately 5,800 living on the islands of St Helena, Ascension and Tristan da Cunha. Economic activity is limited by several factors, including the reliance on ship transport since there are no airports on St Helena or Tristan da Cunha, and the airfield on Ascension, until very recently, has been primarily for military purposes. The island of St Helena is heavily reliant on financial aid from the UK government (Anon., 2003) and is experiencing a downward trend in population due to emigration from a lack of economic opportunities. The people and government of Tristan da Cunha are economically self-reliant from earnings in the lobster fishery. In the past profits from the lobster fishery have been used to build up reserves, but recently, to maintain government services, these reserves have been drawn on (Anon., 2006). Ascension Island, until 2002, received its main funding sources from the military and the two main commercial organizations (BBC, and Cable and Wireless), but since 2002 personal income taxes have funded government activities (Anon., 2008).

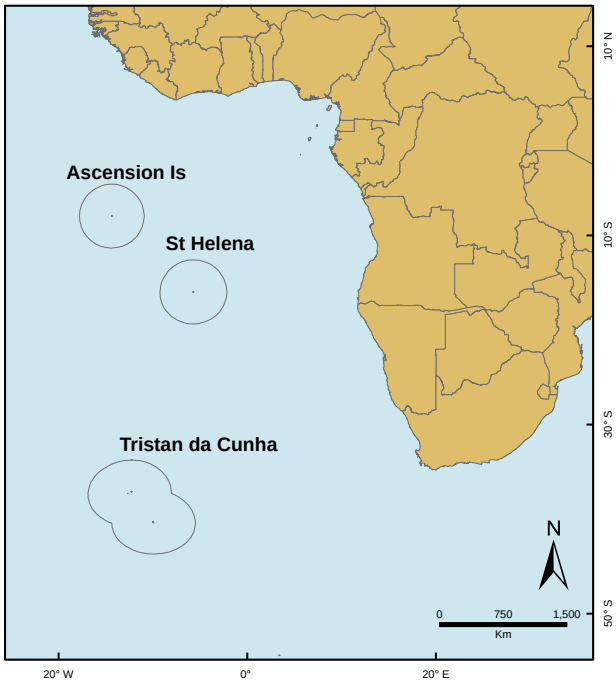

Figure 1. Map of St Helena and its dependencies, Ascension Island and the Tristan da Cunha group. EEZ indicated for each.

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Although the commercial fishery sector is one of the main contributors to the economies of St Helena and Tristan da Cunha, the importance of the non-commercial fishery for all three islands has never been assessed. Edwards (1990) describes the history of fishing around St Helena with anecdotes of fishing from 1589 until the late 20th century. During the days of the British Empire, there were numerous commissions established to look at developing fisheries in St Helena. In 1903, a commission was established to report on "the reason for the present unsatisfactory state of the Fishing Industry" and "the best way of remedying the evil." It reported that 34 men were engaged in hook and line fishing on 11 licensed boats of which only two were really sea-worthy. The other boats were manned by men only partly reliant on fishing for a living and the commissioners thought that that the fishermen were idle and merely indulged in subsistence fishing, catching enough to live on for two or three days and not going out again until they needed more money. The commissioners also thought the fishermen were involved in a conspiracy; by keeping the market supply low they could keep the prices artificially high. It also noted that the leeward grounds and the inshore areas appeared overfished.

After World War II, there were three separate attempts by the government to establish commercial fishing enterprises on St Helena, but the enterprises failed and no significant fishing lasted for more than one fishing season. In 1973, the British Overseas Development Administration implemented another program to develop the commercial fishing industry and from 1976-1978 a group of fisheries specialists worked on St Helena and found that the fishing fleet had developed little since 1910 and fishing methods were as they had been for centuries (Edwards 1990). However, by the late 1970s with the establishment of the St Helena Fisheries Corporation, a continuous commercial fishery was established.

In comparison, the commercial fishery for lobster around the Tristan da Cunha island group has been in continuous operation since 1949. Even when all the islanders were evacuated from 1961-1963 because of a volcanic eruption, the large-scale enterprise continued to fish around the islands. Roscoe (1979) reviews the commercial lobster fishery from its inception to the mid-1970s, and the associated finfish catch, used for bait and for human consumption, was reported for 1989 (Cooper *et al.*, 1992).

Here we estimate fisheries catches from 1950 to 2006 for the commercial and small-scale fisheries. Catches of fish species for St Helena are estimated from data presented in Edwards (1990), who notes that small-scale subsistence fishing has been carried out at St Helena since the first settlers arrived. The inclusion of the estimated small-scale fisheries catches will have the greatest effect at the beginning of the time period, both in terms of nominal catches and the diversity of, prior to the establishment of the commercial fisheries sector in the late 1970s. The other benefit of this catch reconstruction is to separate catch estimates between St Helena and its two dependencies.

METHODS

Commercial fisheries catches were estimated separately for St Helena and for Tristan da Cunha; no commercial fisheries catches were estimated for Ascension. Small-scale fisheries data were estimated for all three islands and in the case for Ascension Island the resident population was discounted by the estimated military population. Small-scale fisheries catch data were first transformed into *per capita* rates. The *per capita* rate combined with the yearly population data were treated as the demand for fisheries products. In turn, the demand was met by the small-scale catch, imports and the amount of catch remaining after exports (Equation 1). Given the demand, catch data as supplied to FAO and trade data, the small-scale catch was estimated for each year. From 1950 to 1977, demand is equal to small-scale catch, but afterwards FAO catch data and net trade must be taken into account.

$$\text{Demand} = \text{small-scale catch} + \text{imports} + (\text{FAO catch data} - \text{exports}) \quad \text{...Equation 1)}$$

Human population data

People reside on the islands of St Helena, Tristan da Cunha and Ascension Island; the other islands are uninhabited. Human population statistics for the three inhabited islands were taken from Populstat (www.populstat.info). The population data for census years were used and linear interpolations were done between census years to create a time series of human population for the three islands from 1950 to 2006. The population for Tristan da Cunha was set to zero from 1961-1963 since all people were evacuated to England due to a volcanic eruption on the island.

Trade data

In order to account for the trade of fishery products, reported since 1977, export and import data (Alder *et al*., 2008) were used to determine the amount of the commercial catch that remained for local use and the amount of demand met by imports. We assume that all imports other than flours, fish-meals and oils were destined for human consumption. Most import data were of relatively small amounts and were treated as imports to the island of St Helena. However, for years when more than 100 tonnes were reported, the import totals were split between the three islands based on the islands' proportion of total population. All catches of lobster from the Tristan da Cunha group were treated as exports and excluded from the mass balance equation (Equation 1).

Commercial fisheries data

St Helena

Prior to the commencement of regularly occurring commercial fisheries in 1978, there were two attempts made (post-1950) to initiate commercial fisheries. The first attempt in 1955 landed 42 tonnes of skipjack (*Katsuwonis pelamis*) and 28 tonnes of albacore (*Thunnus alalunga*) and the second attempt in 1966 landed 7.5 tons of tuna, 2.3 tons of wahoo (*Acanthocybium solandri*), and 1.7 tons of stump lobster (*Scyllarides herklotsii*). Between 1969 and 1974, landings were not consistent and the company ended their contract. Commercial fish catches reported for the island of St Helena from 1978 onwards (Edwards, 1990) are consistent with those reported to FAO. However, the catch of the stump lobster was taken from Edwards (1990) who reports average catches of 1.15 t·year^{-1} (range 0.05 to 4.65 t·year^{-1}) between 1966 and 1989. There are also small catches of the longlegs lobster (*Panulirus echinatus*) taken in an artisanal fishery (see small-scale fisheries data below), that were assessed for their commercial potential in the mid-1970s and again in the 1980s, but the commercial experimental fishery only landed small quantities (Edwards, 1990).

Tristan da Cunha

Tristan da Cunha is dependent upon earnings from its lobster fishery revenues for its economy. The commercial fishery, which targets the Tristan rock lobster (*Jasus tristani*) for the export market, began in 1949 and is comprised of two fleets: a local, small-scale fleet from Tristan and a large-scale commercial enterprise that uses fishing/factory vessels (Roscoe, 1979; Cooper *et al*., 1992). A review of the lobster's biology and its exploitation for the time period 1949-1976, which covers the annual production of tails, was used to determine catches for 1950-1976. A tail to live weight conversion factor of 3.3 was used to convert tail weights to live weight (Roscoe, 1979). Associated with this fishery are catches of octopus and finfish, which are either used for baiting the lobster traps or for human consumption. 70% of the fish caught (by weight) in 1989 were comprised of St. Paul's fingerfin (*Nemadactylus monodactylus*) and barrelfish (*Hyperoglyphe* sp.; Cooper *et al*., 1992). Catches of finfish for bait or human consumption by the local fleet amounted to 62 tonnes in 1989 and 15 tonnes for the two licensed fishing vessels (Cooper *et al*., 1992). The non-tail portion of lobsters (cephalothoraces) are turned into fishmeal, which is exported mostly to Europe. Due to a volcanic eruption, the local fleet and all inhabitants were evacuated from the island from 1961-1963, although the large-scale commercial enterprise continued to fish during this period (Roscoe, 1979). There has been reports of lobster poaching from the waters around Tristan da Cunha with an estimated 75 tonnes of tails

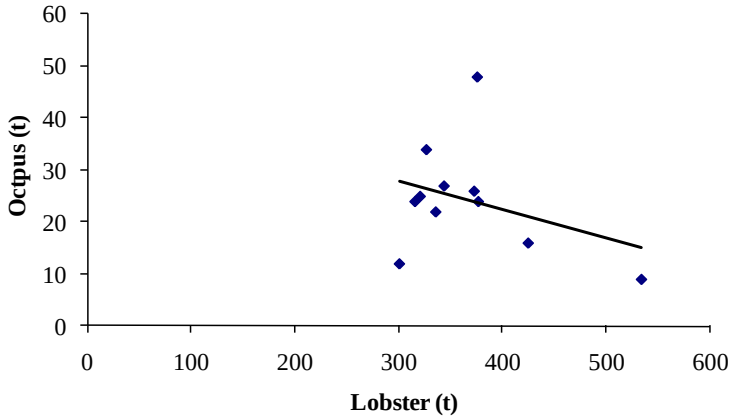

Figure 2. Relationship between reported landings of octopus and lobster (r=0.342).

been taken illegally between 1965 and 1974 (Roscoe, 1979), and there is still concern over illegal fishing (Petit and Prudent, 2008).

Here we replace the earliest time periods of lobster catches as presented by the FAO with those of Roscoe (1979) and also account for octopus catches taken in this fishery by regressing the catch of octopus versus lobster with data as supplied to FAO from 1995 to 2005 and apply this to the earlier time period (Figure 2). We also extend the catches of finfish as a ratio of lobster catches to cover the entire time period. However, the finfish catch taken by the local, small-scale fleet was considered to account for both the amount used for bait and for home consumption (see small-scale fisheries data below). We estimate catches of illegal lobster from 1965 to 2005 using the amount reported for the 1965-1974 period as an average amount per year (Roscoe, 1979).

Small-scale fisheries data

Small-scale fisheries catches were estimated for all three islands using the small-scale estimate for St. Helena. Although there are no recent reports quantifying the amount of catch for this sector, we can estimate the amounts using the assertion that there was little development in the fishing industry from the early 1900s until the commercial enterprises began in the late 1970s (Edwards, 1990), and by assuming that the monthly proportion of catches were the same in 1903 as when the commercial fisheries began in earnest. Further, we assume that the *per capita* consumption rates determined for St Helena can be directly applied to Ascension and Tristan da Cunha.

For Tristan da Cunha, the amount of finfish taken in the small-scale lobster fishery was compared to the estimated *per capita* consumption rates of St Helena to determine whether additional catches should be accounted for. This was done by comparing the *per capita* consumption rates for St Helena to the *per capita* catch rates of finfish from the lobster fishery of Tristan da Cunha.

St Helena's small-scale estimate

For a one month period in March/April 1903, fisheries landings at the Jamestown market were monitored and the numbers or weight of fish were reported; here we assume that the landings reported apply to the month of March and to the whole population (1903 population ~3,340). For the late 1970s and early 1980s, the average totals of catches (by percent or by weight) are available by month (Edwards, 1990). Thus, the proportion of catches taken in March can be determined for the later time period and this proportion is applied to 1903. Using the proportion of yearly catches for the later time period and the actual landings amount for March 1903 the total yearly catch (by species or group) for 1903 was estimated as:

$$\text{Total yearly catch}_{1903} = \text{MarchLandings}_{1903} / \text{MarchProportion}_{1977\text{-}1986} \quad \text{...Equation 2)}$$

For those species which were reported in 1903 by number rather than by weight, the length-weight relationship was:

$$W = aL^b \quad \text{...Equation 3)}$$

where W is weight (in grams) and L is length in (cm). The average length for species was determined from the asymptotic length ($L\infty$) reached by the species *Seriola lalandi* and *Scomber colias* (formerly known as *Scomber japonicas*; Froese and Pauly, 2008). These two species were reported in Edwards (1990) as having an average landed weight of 15 kg and 0.2 kg, respectively. These average landed weights correspond to 62.6% and 46.4% of their $L\infty$ values, respectively (Froese and Pauly, 2008). Thus, the average percentage of $L\infty$ for these two species (54.5%) was used to determine the average length for species that did not have weights reported.

RESULTS

Human Population

The human population for the three islands was estimated at 5,100 people in 1950 and peaked in 1988 at an estimated 6,500 people before declining to approximately 5,400 people in 2006 (Figure 3). The change in population has not been the same between islands and the changes in total population are largely driven by population changes for St Helena. Tristan da Cunha's population grew from an estimated 200 persons in 1950 to an estimated 300 persons since the mid-60s, while the non-military population for Ascension was estimated at 240 persons in 1950 and is currently at 700. The population for the island of St Helena grew from approximately 4,600 persons in 1950 to 5,600 in 1988 before declining to a current population of approximately 4,400 persons. Some of the recent population growth in Ascension has been due to immigration from St Helena.

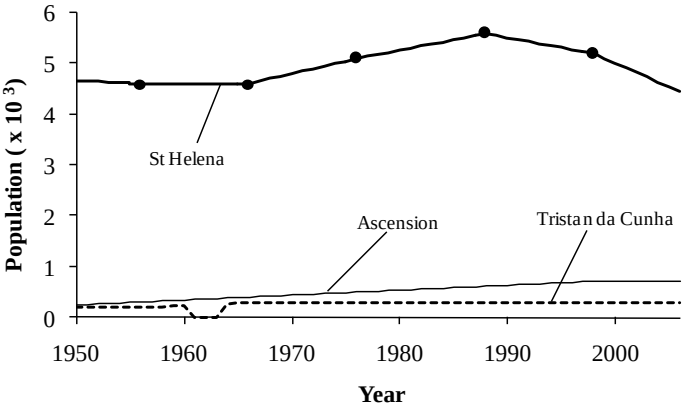

Figure 3. Population of St Helena and its two dependencies. Solid circles represent years of census data and apply to Ascension and Tristan da Cunha).

Trade Data

Trade data for the import and export of fishery products were reported for the 1975 to 2006 period and using appropriate conversion factors the product weights were transformed to live weights (Alder *et al.*, 2008). Data concerning the export of lobster were removed from the trade data and were replaced by the estimated catch of lobster (see commercial fisheries data below). Also, the trade data concerning the categories 'flour, meal and pellets' and 'fats and oils' were excluded from analysis as it was assumed that these categories are not part of the demand in the mass balance Equation (2). It is likely that these categories are used for animal feed (Figure 4).

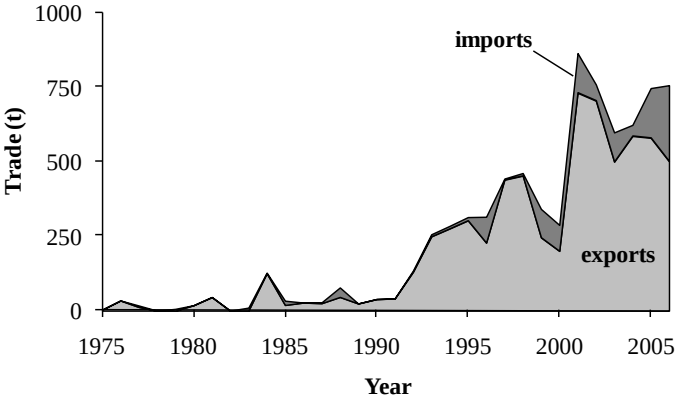

Figure 4. Reported trade data for St Helena. Exports exclude lobster, and the categories 'flours', fishmeals' and 'oils' were excluded from imports.

Commercial fisheries data

St Helena

Commercial fisheries for the island of St. Helena appear to be well described in the data supplied to FAO after 1977 since the data in Edwards (1990) are nearly identical, and this suggests good transfer of commercial fisheries data between the local agency responsible and the global community. The two failed attempts to establish commercial enterprises in 1955 and 1966 landed 70 tonnes and 12 tonnes

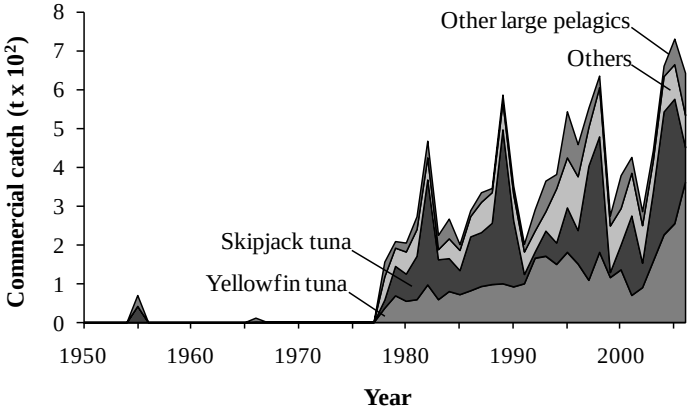

Figure 5. Commercial catches for the island of St Helena.

respectively were included in the estimated commercial catches as exports. During the period from 1966-1978 there were also small amounts of stump lobster (average 1.2 tonnes·yar^{-1}) landed as well. Since the data from Edwards (1990) and data supplied to FAO are nearly identical from 1978 onwards, we rely on the catch totals presented by FAO (Figure 5).

Commercial catches have been increasing since 1978 from an estimated 156 tonnes to 732 tonnes in 2005, with the most important species being skipjack tuna and yellowfin tuna. From 1978 to 1989 commercial catches averaged 297 t·year^{-1}; from 1990-1999 commercial catches averaged 406 t·year^{-1}; and from 2000-2005 they averaged 488 t·year^{-1}. However, there is large intra-annual variation largely due to peaks in catches of skipjack tuna approximately every 7 years.

Tristan da Cunha

Data as supplied to the FAO for the lobster fishery from 1950 to 1975 were replaced with the data from Roscoe (1979) and from 1965 onwards illegal catches of lobster were estimated to be 25 t·year^{-1} . Excluding the first two years of data, which have low catches and reflect the fishery in a start-up phase, catches of lobster averaged 891 t·year^{-1} from 1952 to 1975, with peak catches occurring during the 1960s, before they began to decline after 1969. Data as supplied by FAO for lobster declines from 839 t in 1976 to 373 t in 2005, with average catches of 386 t·year^{-1}.

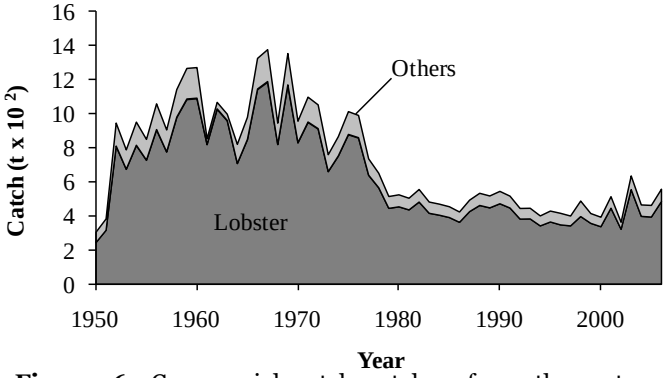

Figure 6. Commercial catches taken from the waters around the Tristan da Cunha island group.

Catches of finfish used for bait by the large, commercial vessels represent 3.5% of the lobster catch; whereas the small-scale, local powerboat fleet catches of finfish for bait and/or home consumption represents 14.5% of the lobster catch, excluding the 1961-1963 time period when the islanders were evacuated due to the volcanic eruption. Average catches of finfish by both sectors were 103 t·year^{-1} for the entire time period. Based on the regression relation between octopus and lobster, octopus catches were estimated to average 6 t·year^{-1} from 1950 to 1977, and from 1978 to 2005 averaged 21 t·year^{-1} (Figure 6).

Small-scale fisheries data

St Helena

Small-scale catches as represented by the one month of landings at the Jamestown market on St Helena in 1903 were estimated to be approximately 14,500 kilograms. The estimated yearly catches for 1903 were approximately 276,600 kilograms resulting in an island-wide *per capita* rate of 82.8 kg·person^{-1}·year^{-1}. This rate was used as the demand for 1950 to 2006 and was also considered to be the demand for the two other populated islands as well.

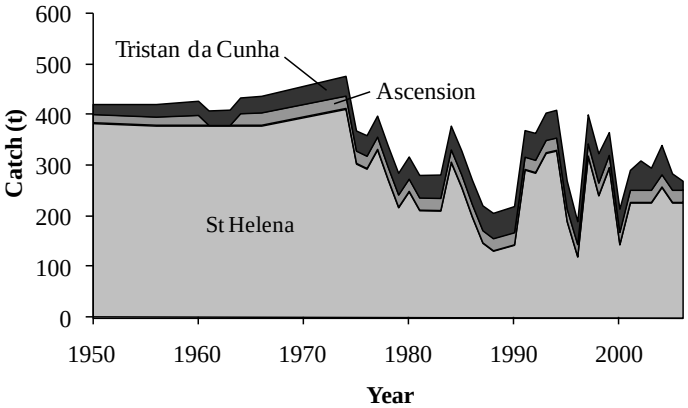

Figure 7. Small-scale fisheries catches destined for subsistence use for the three inhabited islands of St Helena, Ascension and Tristan da Cunha.

Small-scale catches were estimated at approximately 400 t·year^{-1} from 1950 to 1974. After this, small-scale fisheries become more variable as both imports and commercial catches contribute to meeting the demand. Small-scale catches from 1975 to 2006 declined from an estimated 306 t in 1975 to approximately 260 t in 2006 (Figure 7).

Tristan da Cunha

Small-scale fisheries catches for Tristan da Cunha were considered to be reflected in the amount of catch taken by the local lobster fleet. The amount of finfish catch associated with the local lobster fleet, led to a potential average *per capita* supply of 320 kg·person^{-1}·year^{-1} (range: 145-689 kg·person^{-1}·year^{-1}). Because there is no breakdown of what portion is retained for human consumption and what portion is used for bait, and the fact that the potential *per capita* supply was much larger than that for the estimated *per capita* demand, the catches of finfish associated with the lobster catches are the only small-scale fisheries reported here. Catches of finfish by the small-scale lobster were split, assuming that the demand for the population was 82.8 kg·person^{-1}·year^{-1}, and this led to yearly catches rising from an estimated 17 tonnes·year^{-1} in 1950 to 25 tonnes·year^{-1} in 2006 (Figure 7).

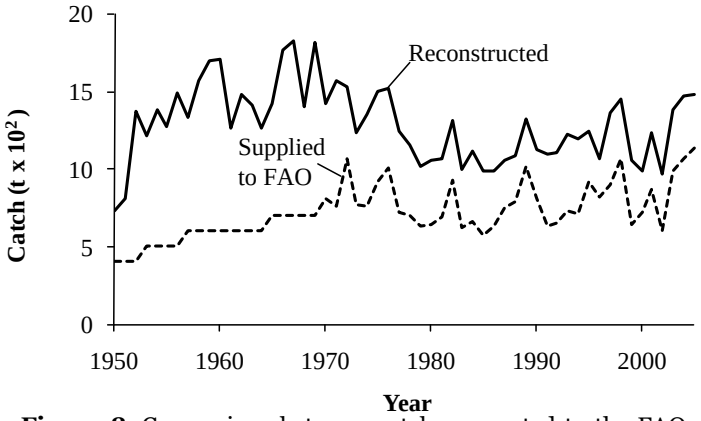

Figure 8. Comparison between catches reported to the FAO and our reconstructed total catches, which include estimates for small-scale catches. The large discrepancy in the early years is largely due to the inclusion of small-scale estimates and differences in lobster (*Jasus tristani*) catches (see text for details).

Ascension

The *per capita* demand rate of 82.8 kg·person^{-1}·year^{-1} led to demand being estimated as 20 tonnes in 1950 to 58 tonnes in 2006. In the late 1990s, some of this demand was assumed to be met by imports of fishery products. Thus, catches in 2006 were estimated at 18 tonnes given imports of 40 tonnes (Figure 7).

DISCUSSION

Estimated fisheries catches for St Helena and its dependencies amount to over 73,500 tonnes from 1950 to 2006. In comparison, data reported to FAO are approximately 41,000 tonnes resulting in estimated catches being 1.8 times larger than those reported (Figure 8). This is largely due to the under-reporting in the early years. Up until 1970, only two species were reported in FAO statistics, yellowfin tuna and Tristan da Cunha rock lobster. Yellowfin tuna catches were reported as 100 tonnes·year^{-1} for this time period and the rock lobster increased from 400 to 600 tonnes·year^{-1}. The rock lobster is only distributed around the Tristan da Cunha island group and was for export and thus, we can conclude that the reported fisheries statistics for St Helena and its dependencies are incomplete. This work hopes to fill in the gaps that are missing in the reported catch statistics.

For the island of St Helena, export data for three years (2001-2003) were greater than the corresponding year's catch as supplied to FAO (by ~ 790 t for the 3 year period) resulting in negative balances in the mass balance Equation (2). However, in four other years (1982, 1989, 2005 and 2006) commercial catches combined with the trade data were slightly larger than demand resulting in positive balances in the mass balance equation implying that no small-scale fisheries occurred in those years. However, here we made the assumption that small-scale fisheries still occurred in these years, and this resulted in the demand over the four years being exceeded by supply by approximately 707 tonnes from 1977-2006. Thus, over the entire time period mass balance was achieved.

This mass balance approach expands on FAO's apparent seafood consumption food balance sheet method by incorporating estimates of small-scale catches, which were excluded in FAO's methodology. In the case of St Helena, a small, isolated island territory that has large costs associated with imports and exports, the FAO method would estimate the apparent seafood consumption rate from 1950 to 1978 as near zero since

yellowfin tuna would be the only fish available on the local market. Such a method obviously underscores the reliance of these people on the ocean for their food security.

After over 100 years, the tables have turned and the global community must now ask their fishery scientists and government bodies responsible the reason for the present unsatisfactory state of fisheries statistics. The best way of remedying the evil may be to have transparency in the reporting of all catch statistics that are made available to the public at large. Most countries only report on the commercial quantities landed—not on the total catches, often despite having better catch statistics available.

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