An Evaluation of the Baitfish Fisheries in Bermuda

Una Evaluación de las Pesquerías de Carnada en las Bermudas

Une Évaluation de la Pêche au Poisson-appât aux Bermudes

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EXTENDED ABSTRACT

Small bony fishes are important ecologically, forming a key link in coastal food webs and providing food for larger fishes and waterbirds. These species, often known as baitfishes, are also important economically as they are exploited by both commercial and recreational fishers for use as bait. In Bermuda, baitfishes include five clupeoid species: the endemic Bermuda anchovy, *Anchoa choerostoma*; Dwarf herring, *Jenkinsia lamprotaenia*; Redear herring, *Harengula humeralis*; Round sardinella, *Sardinella aurita*; and Threadfin herring, *Opisthonema oglinum* (Smith-Vaniz et al. 1999). There is also one atherinoid species, the Reef silverside, *Hypoatherina harringtonensis* (Smith-Vaniz et al. 1999). These fishes form large monospecific and multispecies shoals in shallow coastal waters, where they are targeted by fishers.

Bermuda's location at 32.3°N drives seasonal fluctuations in coastal water temperature and sea conditions. As a result, there is some seasonality in the availability of baitfish, related to both life history and behavioural factors, and also in fishing activity, and therefore the demand for baitfish from both the commercial and recreational fisheries sectors. In Bermuda, baitfish landings have declined from their peak at over 150,000 kg per annum in the 1980s, but have been relatively stable in the range of 30,000 – 40,000 kg per annum since 1999 (Bermuda Government Department of Environment and Natural Resources, unpublished data). However, it is unclear whether this is indicative of population declines or altered fishing practices related to the banning of trap fishing in 1990 (Butler et al. 1993, Smith-Vaniz et al. 1999), or perhaps a combination of these factors.

Current management restricts the size and type of nets used (Bermuda Fisheries Regulations 2010), and prohibits net fishing in 4 bays via the Fisheries (Use of Fishing Nets) Order 1990 (see Figure 1). Commercial fishers may use haul or seine nets up to 150 feet (45.75 m) in length and up to 18 feet (5.5 m) in depth, with mesh sizes of between ⅛ and ½ inch (diagonal stretch). Recreational fishers may only use a cast net up to 8' in diameter.

We analysed historical fisheries landings data and found three modes of commercial bait fishing. Occasional bait fishers landed <100 kg per year, while frequent bait fishers landed 100 – 2000 kg per year. The third group, bait specialists, focus on catching bait in large quantities to sell to other commercial fishers, recreational fishers and retailers. We then surveyed commercial and recreational fishers to examine bait fishing and bait use practices, as well as attitudes towards alternative baits. We conducted semi-structured interviews with two current and one former specialist commercial bait fishers. A mail survey sent to other commercial fishers received 19 responses, which equates to approximately 11% of registered commercial fishing vessel owners excluding the bait specialists. A roving shoreline survey and concurrent online survey of recreational fishers garnered 41 responses.

Most recreational fishers (75%) reported catching at least some bait themselves, and an equal proportion buy at least some of the bait they use. Those who purchase bait buy primarily from smaller retail outlets such as gas stations and convenience stores. A majority of recreational fishers (63%) said they preferred to use Bermuda anchovy and Redear herring for bait. Yet 78% of those surveyed reported fishing for bait when they need it and targeting whichever baitfish species are around at the time. Approximately half of them (48%) fish frequently to catch small amounts for immediate use, while 31% fish somewhat less frequently and catch extra to freeze for future use. A slight majority (58%) reported collaborating with others to catch bait.

Recreational fishers reported using the smaller bait species for chum and as hook bait, and Redear herring as hook bait, but only 39% had strong preferences for using a certain type of bait to target particular species. Almost all of them (92%) expressed interest in purchasing chum alternatives.

Amongst recreational fishers, awareness of the bays closed to net fishing was poor, at 55%, indicating a need for more outreach work in this area. Yet recreational fishers were generally supportive of existing management measures, including the relatively recent restriction on the size of recreational cast nets, and 36% supported closing more areas to net fishing. Additionally, 25% supported requiring a special licence for bait nets and 36% supported additional net regulations, both measures that would only affect commercial fishers.

According to the fisheries statistics database, 78 commercial fishers (43%) reported baitfish landings during the past three years, with approximately half of these bring infrequent bait fishers who reported catching < 100 kg of the evaluated baitfish species per year. Yet 95% of those fishers who completed the mail survey reported catching at least some of their own bait. This could be interpreted as demonstrating that fishers with a particular interest in bait fishing were more likely to respond to the survey. Alternatively, it could indicate under-reporting of bait catches in the official statistics or that different species other than those evaluated in this study are being used for bait. However, 37% of the commercial fishers surveyed reported collaborating with fishers other than their own crew when catching bait, and the owner of the vessel used is the

person that is responsible for reporting the catch. This highlights an important social aspect of the bait fishery that is missing from official catch records.

Most commercial fishers (79%) also purchased bait. Locally caught bait, including the species evaluated in this study as well as Little tunny and Frigate mackerel, was bought from retailers or other commercial fishers. Imported bait purchased from retailers was usually frozen squid, and some fishers reported importing frozen squid directly.

Most commercial fishers (79%) reported using certain types of bait to target particular species. The smaller baitfish species were mostly used for chum, and some fishers use them as line bait to catch small pelagic fishes to use as live baits. About 48% of commercial fishers surveyed currently utilise their fish scraps for chum. Of the remainder, half were interested in pursuing this for their own fishing or to sell. Underutilised species such as jacks, which are common but hard to market, are also being explored as a source of chum.

Interviews with specialist commercial bait fishers highlighted the presence of moorings and large debris items that hinder use of seine nets in many bays as dictating where they fish, while the seasonality of bait markets drives when they fish. They also reported a shift in the depth distribution of Round sardinella and Threadfin herring, which some suggested may be related to increasing water temperatures or declining water quality near shore, but could also be indicative of overexploitation. The dramatic decline of local seagrass beds that has occurred in parallel with increasing sea turtle populations (Fourqurean et al. 2010) was also mentioned as cause for concern.

A temporal shift in the peak abundance of Dwarf herring from early spring to late spring / early summer has been observed, and this had made it difficult to serve markets in the spring. However, it was noted that keeping bait caught during the fall frozen over winter is costly in terms of electricity, and it does not sell as well after being frozen for that long. Small, and therefore immature, Redear herring are present during the spring, and are being targeted to fill this gap. This may be putting that species at risk.

Approximately half of all commercial fishers (48%) felt that current regulations for the bait fishery are adequate, although several noted that they do need to be more actively enforced. Only 14% would support more closed areas, while 19% supported special permits for haul nets. There was, however, slightly more support for further restrictions on net types and dimensions (23%). A closed season was considered impractical by 90% of respondents.

The consensus across both recreational and commercial bait fishers is that the smaller baitfish species remain relatively abundant, along with the Redear herring, but that the Round sardinella and Threadfin herring appear to have declined. Many fishers also expressed concern over the health of nearshore habitats, particularly mentioning water quality and the increasing prevalence of large marine debris items. All groups reported that their bait fishing activity is frequently opportunistic and generally precedes fishing activity. For this reason, the option of using a closed season to manage baitfish species was viewed as awkward because it reduces flexibility

However, bait fisheries elicit the typical conflicts that arise between commercial versus recreational fishers, with each group believing that the other requires additional regulation. Based on these surveys and interviews, there may be some opportunity for additional management via spatial closures, provided that any such areas are carefully selected in consultation with those commercial fishers that fish frequently for bait, and via further regulation and permitting of haul nets. These insights will inform balanced management for these ecologically and economically important species going forward.

KEYWORDS: Baitfish, commercial fishery, recreational fishing, Bermuda

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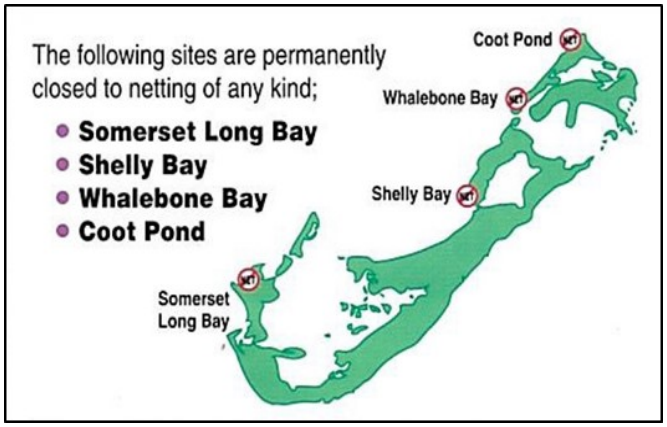

Figure 1. Bays around Bermuda that are closed to bait fishing.