



# BELIZE FISHERIES PROJECT

## **Case Study**

Caribbean spiny lobster (*Panulirus argus*)  
*"...Belize's premier commercial fishery  
overexploited"*

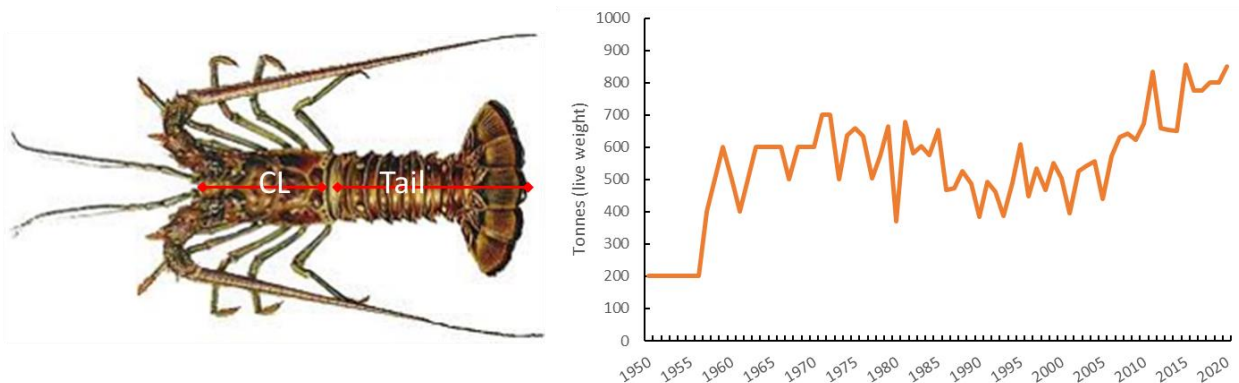
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# Caribbean spiny lobster (*Panulirus argus*)

*“...Belize’s premier commercial fishery overexploited”*

## Valuable Resources

Caribbean spiny lobsters are conspicuous residents in a variety of coastal ecosystems and support important fisheries throughout the region. In Belize, healthy mangrove, seagrass and coral reef habitats are critical for lobsters to complete their entire lifecycle. The exploitation of lobsters has occurred for approximately 100 years beginning with the use of bully nets in 1915 and the successful introduction of traps in 1921 with local scarcity of lobsters observed by 1925 [1, 2]. The fishery remained limited and sporadic through the 1930s and 40s with inconsistent exports but landings expanded rapidly following WW II with the interest of American buyers. Beginning in the early 1960s, as northern lobster populations were depleting, the fishery expanded to grounds south and to offshore atolls [2-4] driven by improved transport and storage, the development of fishing cooperatives, larger scale processing facilities and consistent markets [2]. Steady levels of exploitation continued for several decades, with some concerning fluctuations, followed by dramatic increases at the beginning of the 21<sup>st</sup> century when all potential fishing grounds were discovered and fully utilized for some time [4, 5]. Increasingly high consumer demand for lobsters in the international market [6] as well as expanding use for local tourism in recent decades has firmly placed spiny lobster catches as the most important fishery in Belize. The lobster fishery represented 67% in export earnings for capture fisheries sector in 2008 [7]. Export revenues doubling between 2003 and 2018 with current annual landings in excess of 800 tonnes (Fig. 1) [5]. Landings, exported largely to the USA, are mostly tails as well as some small proportion of whole animals and head meat, together valued at >12 million USD annually [8]. (Revise using SAU)

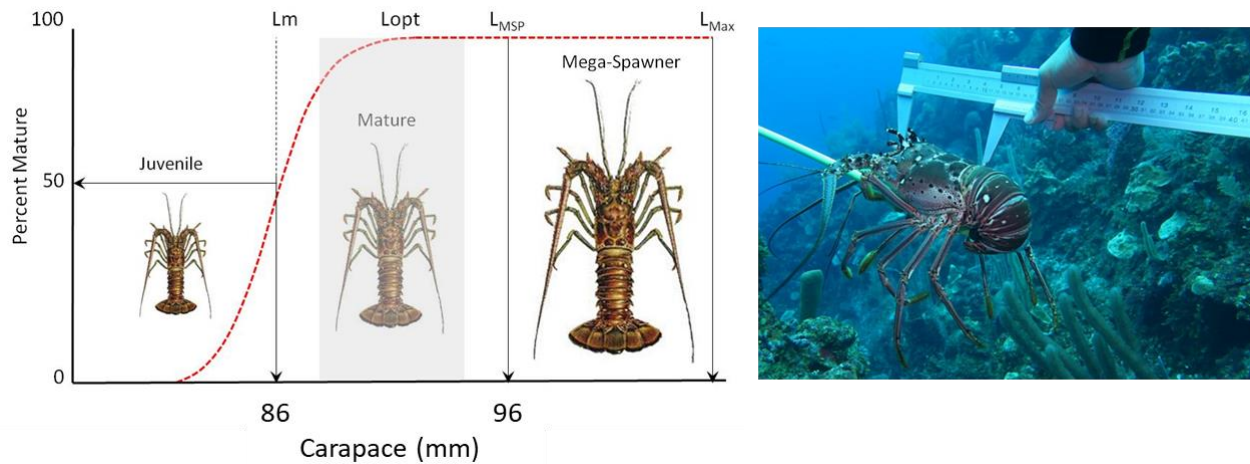


**Figure 1:** Caribbean spiny lobster, measure of carapace (CL) and FAO landings data for Belize.

## Overfished Populations

While the importance of spiny lobsters to Belizean livelihoods, local tourism and export revenues is undeniable the ability of the resource to maintain these benefits is in doubt. Observations of many lobsters caught at very small sizes, high levels of fishing mortality and low reproductive

potential are all signs of a resource that is overfished [4, 9]. Landings levels in excess of 600 tonnes since 2007 are well above suggested sustainable levels of 230 tonnes and in context of the many fluctuations in production seen during the 1990s when populations were thought to be fully exploited [10]. In addition, the decades long-held minimum size regulation for carapace length (76 mm, 3.0 in.), the most easily measured indicator of size/age for lobsters, and a corresponding tail weight (113.4 g, 4 oz) did not facilitate best harvest practices of only removing mature animals from the population. This has severely limited: (1) the opportunity for many lobsters to grow to maturity and engage in reproduction at least once; (2) growing time to provide optimal size, meat yield and profit per individual lobster and (3) survival of a significant proportion of very large individuals (CL > 96 mm, i.e. mega-spawners) that provide the highest contributions to overall reproduction and the future of the fishery (Fig. 2) [4, 11-13]. Sustainable minimum carapace lengths, determined at a conservative 50% maturity, were recently estimated as 98 mm (3.85 in.) for males and 86 mm (3.38 in.) for females [4]. The most recent report by Seafood Watch (Jan. 9, 2023) has recommended an “AVOID” category for Belizean spiny lobster [14] and Ocean Wise ([www.ocean.org](http://www.ocean.org)) has stated that use of Belizean lobster products from diving and traps are “NOT RECOMMENDED”. These ratings cite concerns over stock status, high fishing mortality, and the effectiveness of the “Managed Access Program” to control fishing effort which all have negative consequences for the reputation of Belizean fisheries products. Finally, the spiny lobster Fisheries Improvement Program (FIP) in Belize, begun in 2019 and ending in 2024, has seen extremely limited progress overall and very low scores in the key areas of improving harvest strategies, stock assessments and stock rebuilding ([Fisheriesprogress.org](http://Fisheriesprogress.org)) which will likely limit the possibility of sustainable certification under the Marine Stewardship Council [7].



**Figure 2:** Caribbean spiny lobster approximate maturity curve (red dash) for females [4]. Carapace length (CL, mm) at 50% ( $L_m$ ) and 95% maturity are 86 and 91 mm. Optimal size, approx. 88 to 94 mm CL ( $L_{opt}$ , grey area = mature cohort with maximum abundance and individual yield) and mega-spawner size ( $L_{MSP}$ ) is > 96 mm CL. Male size thresholds are higher [4]. Photo – large male lobster (130+ mm CL) captured using snare, measured and released alive at Glover’ Reef, Belize in 2018.

## Management Problems & Modifications

While a higher proportions of replenishment zones (RZ i.e., no-take areas) embedded within a managed access areas do have positive effects on lobster population health and productivity it is currently ineffective on its own in eliminating the overfished nature of the populations [4]. This may be due to (1) limitations of enforcement and associated higher levels of poaching and (2) restrictions on the area of protection to generate sufficient benefits to surrounding populations given the current high levels of legal fishing effort on most fishing grounds [15-17]. The recent raising of the minimum carapace limit back to 82.5 mm (3.25 in.) and new tail weight of 128 g (4.5 oz) (Belize Statutory instrument # 128 of 2021) is a positive step towards sustainability. However, these refinements to the minimum size limits do not match. Such a mismatch between carapace length (CL) and tail weight (TW) was previously observed by fishers in the late 1990s where a whole landed lobster not passing the minimum CL inspection (3.25 in) could have the tail removed and landed legally as greater than 4.0 oz. This was investigated by the Belize Fisheries Department and CARICOM Fisheries Management Unit who found that an 82.5 mm (3.25 in.) CL lobster had a TW of 155 g (5.4 – 5.5 oz) [18]. Therefore, the current revised lobster minimums will allow legal landing of tails that are a full oz lower (i.e. using 4.5 oz) in weight than those which an 82.5 mm CL (3.25 in) lobster would on average process, 5.5 oz. [18]. Given the very high proportion of tails landed this would effectively make the minimum working CL 78.6 mm (3.1 in.) and only slightly larger than the recently revised 76 mm CL which was inadequate to protect the landing of may immature lobsters. The raising of both CL and TW to levels that minimize (1) landing of immature individuals (< 50% maturity,  $L_m$ ), (2) promote the landing of optimal sized individuals ( $L_{opt}$ ) and (3) allow the preservation of a significant proportion of mega-spawners ( $L_{MSP}$ , recommended as > 20% seen in catch, [12]) (fig. 2) in combination with effectively enforced and expanded replenishment zones will go a long way towards restoring sustainability. This may have the added benefits of reducing individual fisher effort, storage and processing requirements increasing the efficiency and profitability of the fishery along the entire production chain and providing consumers with confidence in the equitability to fishers and long-term sustainability of Belizean spiny lobster resources.

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