

# Fishers' Observations of Climate Change Impacts on the Flyingfish Fishery in Barbados

## Observations des Pêcheurs sur les Impacts du Changement Climatique sur la Pêche au Poisson Volant à la Barbade

## Las Observaciones de los Pescadores Sobre los Impactos del Cambio Climático en la Pesquería del Pez Volador en Barbados

ANDERSON KINCH<sup>1</sup> and HAZEL A. OXENFORD<sup>2\*</sup>

<sup>1</sup>Bridgetown Fisheries Complex, Bridgetown, Barbados

<sup>2</sup>Centre for Resource Management and Environmental Studies,  
University of the West Indies, Cave Hill Campus, Barbados

\*[hazel.oxenford@cavehill.uwi.edu](mailto:hazel.oxenford@cavehill.uwi.edu)

### EXTENDED ABSTRACT

Barbados is famously known as 'the land of the flyingfish' because of its significant flyingfish fishery which has traditionally contributed about 60% of the island's total annual fish landings by weight, has an ex-vessel value in excess of US\$2 million and an estimated value-added contribution to the economy of around US\$40 million (Mahon et al. 2007, Oxenford et al. 2007). However, in recent years the availability of flyingfish has fluctuated widely, disrupting the flyingfish fishery, causing significant concern and economic hardship, particularly in the post-harvest sector (Ramlogan et al. 2017). Here we report on the many changes observed at sea by fishers over the last decade and in particular on recent changes in the traditional flyingfish fishery.

Personal experience as a long-term, full-time, commercial fisher (first author), casual and directed conversations with colleagues and other oceanic pelagic fishers from landing sites around Barbados, as well as unsolicited reports from fishers were all used to gather information on fishers' observations of changes in offshore fishing conditions and the impacts of change on their fishing techniques and catches over the last decade. Official landings data from the Barbados Fisheries Division were also used to corroborate fisher reports of changes in catch.

Fishers' observations were highly consistent with one another with regard to substantial changes in the strength and direction of ocean currents and winds, changes in sea state, ocean colour, and the presence and consequences of *Sargassum* seaweed influxes. Fishers note that ocean currents are no longer predictable and are often 'reversed' (flowing in the opposite direction to that expected) and much stronger than previously experienced. They also report a significant change in ocean water colour from the customary dominance of blue water ('ink blue' or 'shades of blue') to green water being much more common. They also state that in recent times the strong seasonal winds (NE Trade Winds) that generally occur between Christmas and Easter have been blowing stronger and for longer, right through into May in recent years. This has resulted in much rougher offshore sea conditions than the fishers are accustomed to. All fishers also spoke of the excessive amounts of floating *Sargassum* seaweed that they have been encountering at sea since 2011, but especially over the last four years (2014-2018). Some fishers also mention that there seem to be fewer seabirds.

Impacts on the fishery, as reported by fishers, included fewer days at sea, largely due to unsafe sea conditions, particularly for wooden hulled vessels, and for those navigating at night. Some iceboat and longline fishers reported fewer fishing trips per month, stating that multi-day trips were being extended and more fuel was being used because of longer travel times caused by stronger countercurrents. Iceboat fishers stated that they also had to go further afield and stay out longer in search of flyingfish that have become far more unpredictable and present in waters around Barbados for a much shorter season, and more difficult to catch in years of high *Sargassum* abundance. Fishers are also reporting several changes in flyingfish behaviour that are impacting their catchability using traditional fishing techniques. For example, some say that flyingfish can no longer be drawn to the fishing vessel using the traditional FADs (i.e. bundles of sugarcane trash that are tethered to the vessel by a long rope to attract spawning flyingfish, and then slowly retrieved by pulling the FAD alongside the vessel (Willoughby 2007)). Therefore, aggregations of spawning flyingfish, that typically use the FADs as spawning substrate, can no longer be caught over the side of the vessel with the traditional handheld dipnets. Several fishers stated that they believe the flyingfish are spawning on the *Sargassum* instead, and are therefore no longer attracted by the FADs. Others believe that the flyingfish are being chased away and/or preyed upon by other fish that have taken up residence under the *Sargassum*, such as young almaco jacks (locally called amberfish) and ocean triggerfish (locally called turpits) and therefore the flyingfish are much less abundant than previously. Fishers have also noted that flyingfish are now mostly caught at night, making day-fishing trips much less viable, and that the fish are much smaller, causing many fishers to switch to gillnets of a smaller mesh size and causing concern among others about the sustainability of this practice. Many dayboat fishers reported that they simply stayed at home when they could not catch flyingfish because of the green water and or the presence of *Sargassum*. The overall outcome has been a drastic reduction in the landings of flyingfish and the revenue generated by this fishery in years of high *Sargassum* abundance (Figure 1). The *Sargassum* is also aggregating large numbers of very young dolphinfish, not previously available to the pelagic fishery in Barbados, and these juveniles are now being caught in huge numbers, causing significant concern amongst some fishers and fishery managers, whilst fewer large dolphinfish are being caught. For example, one fisher shared his 2018 dolphinfish catch data up to 1 September, which showed that out of a total catch of 4,454 kg, 75% individuals weighed less than 3.4 kg, 20% were between 3.5 - 6.4 kg

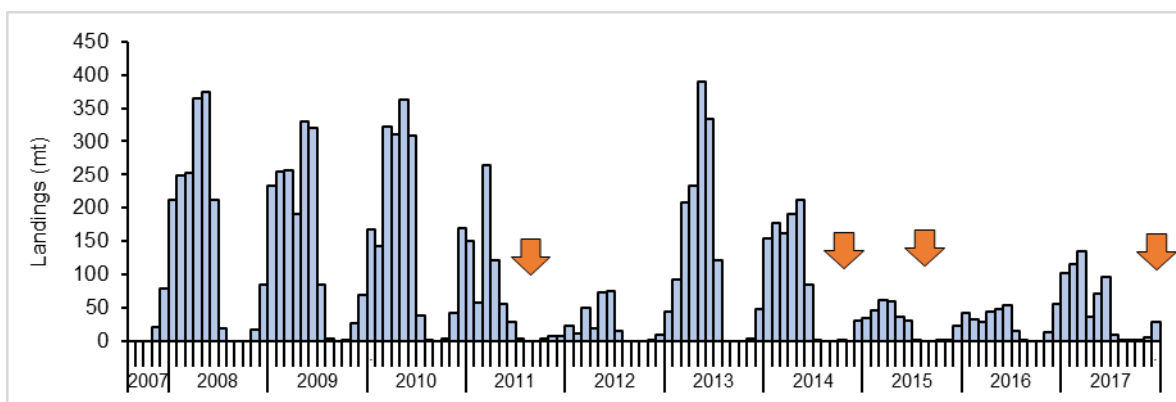
(20%) and just 5% were greater than 6.5 kg (Figure 2). This is in stark contrast to the size distribution of dolphinfish in catches by the Barbados pelagic fishery in previous times (Figure 2), where only 6% of the catch typically comprised very small fish (< 3.4 kg) and 50% was made up of adult fish > 6.5 kg (Oxenford 1985). In the last two years of high *Sargassum* abundance, fishers have begun to target alternative *Sargassum*-associated species, in particular the almaco jack, that may have surpassed catches of flyingfish in 2018.

We conclude that these observations are consistent with the projected climate change impacts, and they highlight the critical importance of fisher observations (traditional knowledge) in providing firsthand information that is highly relevant to fishery management, and contributes significantly to a better understanding of climate-related changes and impacts, especially in this region where oceanographic data and research are extremely limited.

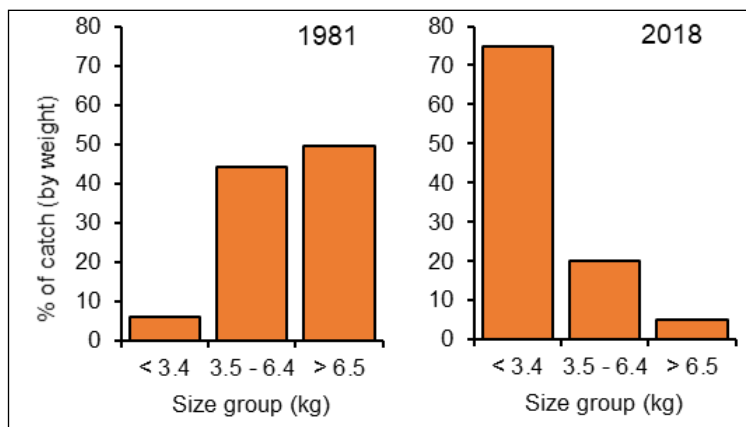
**KEYWORDS:** Flyingfish, climate change, pelagic fishery

#### LITERATURE CITED

- Mahon R., C. Parker, T. Sinckler, S. Willoughby, and J. Johnson. 2007. *The Value of Barbados' Fisheries: A Preliminary Assessment*. Fisheries Division, Ministry of Agriculture and Rural Development, Barbados, Fisheries Management Plan Public Information Document No. 2, 24 pp.
- Oxenford, H.A. 1985. *Biology of the Dolphin Coryphaena hippurus and its Implications for the Barbadian Fishery*. PhD Dissertation, University of the West Indies, Cave Hill Campus, Barbados.
- Ramlogan, N.R., P. McConney, and H.A. Oxenford. 2017. *Socio-Economic Impacts of Sargassum Influx Events on the Fishery Sector of Barbados*. Centre for Resource Management and Environmental Studies, The University of the West Indies, Cave Hill Campus, Barbados. CERMES Technical Report No. 81, 86 pp.
- Willoughby, S. 2007. The Flyingfish fishery of Barbados. Pages 3-8 in: H.A. Oxenford, R. Mahon, and W. Hunte (Eds.) *Biology and Management of Eastern Caribbean Flyingfish*. Centre for Resource Management and Environmental Studies, University of the West Indies, Barbados.



**Figure 1.** Flyingfish landings data for Barbados over the last decade showing the significant impact of sargassum influx events (orange arrows). Landings data source: Barbados Fisheries Division.



**Figure 2.** Size structure comparison of the dolphinfish catch showing individual fish weight groups as a percentage of the total catch. Data represent recorded catches from January to September. 1981 data are from Oxenford (1985) and represent a random subsample of dolphinfish catches landed by the pelagic fleet. 2018 data are from an individual pelagic fisher and represent a record of his total dolphinfish catch.