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Bigeye tuna catch limits lead to differential impacts for Hawai`i longliners

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ABSTRACT

Bigeye tuna (*Thunnus obesus,* Scombridae) are a globally important commercial fish. About 60% of the world's bigeye is caught in the Pacific Ocean, where stocks have been subject to overfishing and longline fleets are governed by increased conservation measures. One conservation measure entails multilateral bigeye quota reductions. Since 2010, quota reductions have resulted in four extended closures for Hawai`i longliners. Previous research indicated that regulatory closures may result in differential socioeconomic impacts, but little is known about how four extended closures may affect fishers and fishing trips in a diverse longline fleet with 142 active vessels. The purpose of this research is to assess the trip-level impacts of closures on Hawai`i longliners and determine whether impacts could be lessened while sill meeting conservation measures. To do this, economic data and longline logbooks for Hawai`i longliners were analyzed from 2010 to 2015, and 28 longline fishers were interviewed in Fall 2015. Vessels allowed to fish during closures spent nearly two more days at sea not fishing compared to the same month in years without a closure, with no significant difference in trip length. Vessels with special permits are allowed to fish closer to port during closures, while the larger vessels (25% of the fleet) were restricted from retaining bigeye between 32 and 61 days a year, raising equity concerns across the fleet. Our findings also suggest that two levels of collective action may be needed to meet Pacific-wide economic and conservation goals for an economically and ecologically important pelagic common-pool marine resource.

1. Introduction

Pelagic marine fisheries present distinct regulatory challenges. Many pelagic fish migrate long distances across geopolitical and institutional boundaries, making them de facto common property shared across dozens of international fishing fleets [1]. Effectively managing pelagic marine fisheries is costly, requiring extensive resources for data collection, trained experts to conduct stock assessments, and effective governing institutions [2]. To be effective, pelagic fisheries management requires cooperation or collaboration on both science (stock assessments) and governing institutions [3], which are common attributes of a collective action problem [4]. There is no 'global governance' coercion or authority available to compel nation states to conserve or enforce quotas for pelagic species, restrict fishing from areas of the high seas, or assign catch shares.

Pelagic marine fisheries such as bigeye tuna (*Thunnus obesus,* Scrombridae) are managed by Regional Fishery Management Organizations (RFMOs) that employ consensus decision-making to develop catch limits for international fishing fleets. The limits are negotiated among member nations and participating non-members of RFMOs for two geographically distinct segments of the Pacific Ocean: the Inter-American Tropical Tuna Commission (IATTC) Area in the Eastern Pacific Ocean and the Western and Central Pacific Fisheries Commission (WCPFC) Area. Hereafter, these limits are referred to as quotas, following common usage in Hawai`i. Although nation states agree upon annual quotas and other conservation and management measures for bigeye within and beyond their respective Exclusive Economic Zones (EEZs) during WCPFC and IATTC meetings, these measures are intended to be implemented and enforced under national laws and regulations [5,6].

Approximately 60% of global bigeye tuna is caught in the Western and Central Pacific. In 2014, the WCPFC Scientific committee determined that bigeye tuna stocks in the Western Pacific required continued reductions in fishing [7], necessitating action to reduce bigeye tuna quotas [6,8] that were first implemented by the U.S. in 2009. To address bigeye overfishing in the Pacific, WCPFC members agreed upon phased catch reductions over a three-year period starting in 2015. The original U.S. catch limit from 2009 to 2014 implemented by the U.S. [9], and the subsequent decreasing catch limits in 2015 and 2016 [6], have coincided with bigeye tuna catch increases for the Hawai`i

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longline fleet, the primary U.S. fleet targeting bigeye tuna in the Pacific [10]. These catch increases have contributed to four effective closures for the Hawai`i longline fleet in the WCPFC Area since 2009.

The term “closure” is the commonly used to describe the U.S. regulatory action resulting from reaching a quota in the Hawai`i longline fishery. Closures restrict longline vessels from retaining, transshipping, or landing bigeye tuna when the quota is reached. Longliners may continue to fish for other species while discarding bigeye, but they almost never do. A closure is set for a date that the fleet is anticipated to reach the quota, since formal advance rulemaking procedures are involved in setting the closure date. The fishery may reach, not reach, or exceed the quota by the time the fishery closes.

In 2009, Hawai`i longliners were expected to reach their WCPFC quota before the end of the year, and the fishery was effectively closed in the WCPFC Area for the last three days of the year. Hawai`i longliners reached their WCPFC quota again in late 2010, effectively closing the WCPFC Area for the last 40 days of the year [11]. However, after the 2010 closure, Congress passed the Consolidated and Further Continuing Appropriations Act (CFCAA) in 2011, (Pub. L. 112–55, 125 Stat. 552 et seq.). Pursuant to this Act and National Oceanic and Atmospheric Administration/National Marine Fisheries Service (NOAA/NMFS) regulations under 50 CFR 300.224, if the U.S. vessel landing the fish was included in a valid arrangement under Sec. 113(a) of the CFCAA, its catch in the WCPFC Area during those periods was attributed to the fishery of the U.S. Territory named in the arrangement [12]. This provision is based on the principle that the WCPFC quota for the U.S. Nation does not apply to U.S. Territories. A WCPFC Convention and the Conservation Measure exempts “Small Island Developing States and Participating Territories” such as American Samoa, The Commonwealth of the Northern Mariana Islands (CNMI), and Guam from any measure that would restrict their responsible fisheries development [13]. Hawai`i longliners fishing under this arrangement with these U.S. territories were required to make a negotiated payment to a sustainable fisheries fund in the respective territory to support fishing infrastructure and fisheries development [14].

Technically, the Hawai`i fishery in the WCPFC Area has been closed in the latter part of every year from 2009 to present, since longline catch limits were instituted (see Table 1). However, in many of these years, most vessels were allowed to continue fishing in the WCPFC Area under specified arrangements to attribute their bigeye tuna catch to a U.S. Territory. In this paper, the term “effective closure” refers to those situations where such arrangements were not in place at the time of closure, and most vessels ceased fishing in the WCPFC Area.

There was no WCPFC closure in 2011–2014 because of the CFCAA [12]. The bigeye tuna catch limits were forecasted to be met on the dates listed in Table 1. In 2014, the U.S. domestic fishery management body with authority in the region, the Western Pacific Regional Fishery Management Council (the Council), approved Amendment 7 to the Pelagics Ecosystem Management Plan that enabled the expiring CFCAA provision to be replaced with similar arrangements. U.S. Pacific territories can share unused bigeye tuna quotas with Hawai`i longliners [14]. In exchange for a territorial quota, a group comprised of and representing all Hawai`i longliners, Quota Management, Inc., makes a negotiated payment into that territory's sustainable fisheries fund. After the CFCAA provision in 2011 and the Council approval of Amendment 7 to the Pelagics Fishery Ecosystem Plan in 2014, scholars predicted that Hawai`i longliners would no longer experience effective closures [11]. However, the fishery was effectively closed to fishing in the WCPFC Area for 65 days in 2015, for 49 days in 2016, and 39 days in 2017.

In recent years, effective closures affected many Hawai`i longliners. During effective closures, some Hawai`i longliners could fish for bigeye, while others could not, leading to differential socioeconomic impacts. Without an attribution arrangement, Hawai`i longliners are only allowed to fish for bigeye: 1) if they are willing to make long trips (greater than 800 km away) to the Eastern Pacific Ocean or 2) if they possess both a Hawai`i limited entry longline permit and an American Samoa limited entry longline permit (in other words are ‘dual-permitted’) which allows them to attribute their catch to American Samoa while landing in Honolulu. In 2017, just 23 of 146 active vessels (16%) were dual-permitted. Non dual-permitted vessels that chose to fish for bigeye during effective closures needed to travel to the IATTC Area, a one-way distance of at least 814 km. Further complicating these trips, longline vessels travelling to fish the IATTC Area during the 2015 and 2016 effective closures coincided with the peak of two of the most active hurricane seasons on record for the Eastern Pacific [15,16]. Since 2007, Hawai`i longline vessels greater than 24 m have been subject to a 500 metric ton bigeye tuna quota in the IATTC statistical Area. This quota was reached between August and November from 2013 to 2017, further restricting their options to fish during an effective WCPFC Area closure that overlaps in time with an IATTC Area closure (see Table 2).

Socioeconomic monitoring of fisheries can measure and anticipate future regulatory impacts and help understand drivers of change in marine ecosystems [17]. Data gathered during socioeconomic monitoring can be used to test hypotheses about regulatory policy and outcomes [18] and recognize the factors relating to successful regulatory programs [19]. Previous monitoring efforts in fisheries have estimated the effects of climate change and ocean acidification on fisheries socioeconomics [20] and examined the impact of spatial closures on commercial fisheries [21]. Scholars previously conducted socioeconomic monitoring on the Hawai`i longline fishery to document the impacts of regulatory closures on specific labor and ethnic segments [11,22]. Scholars also examined the applicability of catch shares to many Hawai`i fisheries in 2010, including the Hawai`i longline industry [23]. Socioeconomic monitoring was also conducted following the 2010 regulatory closure in Hawai`i [11]. After the 2010 closure, the authors concluded that future closures could be better anticipated and resolved using territorial quota sharing agreements such as CFCAA and later, Amendment 7.

Despite this, three extended closures have occurred since 2010; in

Table 1
Summary information on Western and Central Pacific catch limits, forecasted closure date, reopening dates, total days the fishery was closed, and percentage of the year that the WCPFC is closed.

Year	WCPFC catch limit (mt)	WCPFC forecasted closure date	Date the WCPFC reopened	WCPFC closure Total days	Percentage of the year that WCPFC Area was closed
2017	3138	September 1	October 10	39	11%
2016	3554	July 22	September 9	113	31%
2015	3502	August 5	October 9	83	23%
2014*	3763	November 8	–	–	0%
2013*	3763	December 13	–	–	0%
2012*	3763	November 27	–	–	0%
2011*	3763	November 17	–	–	0%
2010	3763	November 22	January 1, 2011	40	11%
2009	3763	December 27	January 1, 2010	4	1%
2005–2008	–	–	–	–	–