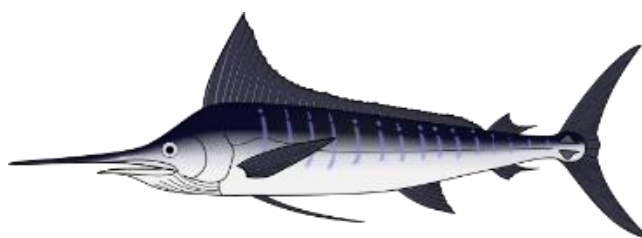


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Proposals for the Recovery Plan for Striped Marlin in the western and central North Pacific Following the Implementation of Management Measures¹

Mikihiko Kai² and Marko Jusup²

²Fisheries Resources Institute, Highly Migratory Resources Division,
Japan Fishery Research and Education Agency
2-12-4 Fukuura, Kanazawa, Yokohama, Kanagawa 236-8648, JAPAN
Email: kai_mikihiko61@fra.go.jp



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Abstract

The 2023 stock assessment for striped marlin (*Kajikia audax*) in the western and central North Pacific (WCNPO) identified the stock as overfished and likely subject to overfishing. This stock state highlighted the need for a rebuilding plan, prompting subsequent future projections with the aim to restore spawning stock biomass to 20% of the unfished level within 10 years with at least a 60% probability of success. Finally, a management measure was adopted specifying a total annual catch limit of 2,400 metric tons for 2025–2027, with country-specific allocations. This working paper proposes three actions: clarifying catch allocations arising from management scenarios used in existing future projections, evaluating whether the rebuilding goal can be achieved under maximum allowable catches compatible with country-specific allocations, and determining necessary allocation adjustments for the second management phase post-2027 if current scenarios prove insufficient. These proposals aim to align management strategies with allocation constraints while ensuring the rebuilding goal is met.

Background

A benchmark stock assessment for striped marlin (*Kajikia audax*) in the western and central North Pacific (WCNPO MLS) was conducted using Stock Synthesis (SS3) with fishery data from 1977–2020 by the ISC BILLFISH Working Group (BILLWG or WG) in 2023 (ISC 2023a). The results indicated that the stock was overfished ($SSB_{2018-2020}/20\%SSB_{(F=0)} = 0.37$) and was likely subject to overfishing ($F_{2018-2020}/F_{20\%SSB_{(F=0)}} = 1.09$) relative to the dynamic 20-year 20% $SSB_{(F=0)}$ -based reference points, where $SSB_{(F=0)}$ is the average of the dynamic B_0 over the last 20 years (2001–2020).

The WG recognized substantial uncertainties, encompassing—among others—the stock structure, the catch and CPUE data, the life history parameters such as growth and maturity, and the initial equilibrium conditions. Due to these various uncertainties, the WG suggested that catch should be kept at or below the recent level (2018–2020 average catch = 2,428 mt) until the assessment is further improved or additional projections are provided (ISC2023a).

The WG conducted the future projection analyses based on 2023 stock assessment results to formulate a rebuilding plan (ISC2023b). The WG used a stochastic age-structured projection model (AGEPRO software; Brodziak et al. 1998) which can account for future variability in recruitment, initial population size, and process error in life history and fishery selectivity parameters.

The goal of the rebuilding plan was to rebuild the spawning stock biomass to 20% of the unfished level, or 20% $SSB_{(F=0)} = 3660$ mt, within a rebuilding time horizon of 10 years (2025–2034) and with a probability of rebuilding success of at least 60%. The WG developed four management strategy scenarios for the rebuilding analyses: constant fishing mortality, constant quota, phased fishing mortality, and phased catch quota (**Table 1**) under 3-model ensemble for recruitment with model weights 0.04, 0.84, and 0.12 (short term: 2015–2019, medium-term: 2000–2019 and long-term: empirical stock-recruitment relationship). All scenarios except two ($F_{status-quo}$ and F_{MSY}) achieved the target spawning biomass with 60% probability.

The Western and Central Pacific Fisheries Commission (WCPFC) adopted a new management measure below for WCNPO MLS at the 21st Plenary meeting (WCPFC 2024).

Commission Members and Cooperating Non-Members (CCMs) shall ensure that the total catch limit will not exceed 2400 metric tons of retained catch for each year between 2025 - 2027, which is based on a 60% reduction from the highest catch between 2000 and 2003.

*Japan, Chinese Taipei, Korea, United States, and China shall, respectively, ensure their retained annual catches of North Pacific striped marlin shall not exceed the annual catch limits in the **Table 2**, without prejudice to future agreements on allocation of TAC.*

The main purpose of this working paper is to propose steps leading to phased catch quota scenarios (i.e., 2400 mt per year until 2027 followed by a tonnage that is to be determined) that leads to management success while remaining compatible with allocations to each country as specified by the management measure (**Table 2**). This is to facilitate considerations as to how the catch limits should be adjusted after 2027 in alignment with the management goal.

Proposals

Proposal 1: Japan requests that the WG clarifies the catch allocations to each country (i.e., Japan, Chinese Taipei, Korea, United States, China) under the constant quota and phased catch quota management scenarios used in the rebuilding analyses from April 2024 (Brodziak 2024). The purpose is to determine how existing management scenarios fare against allocation constraints in **Table 2**.

Proposal 2: Japan requests that the WG examines whether the rebuilding goal can be achieved in future projections under the constant quota scenario that fully utilizes catch allocations in **Table 2**. The purpose is to determine the probability of success under maximum allowed catches.

Proposal 3: Japan requests that the WG considers what allocations would be necessary after 2027 in phased catch quota scenarios to achieve the rebuilding goal, if such a goal could not be met under the scenarios mentioned above. The purpose is to determine minimum proportional allocation reductions relative to the values in **Table 2** for the second management phase to lead to success.

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Table 1. Summary of ten-scenarios used in the rebuilding analyses.

No	Scenario
1	$F_{2025-2034} = 0.373$
2	$Catch_{2025-2034} = 2,175$ mt
3	$F_{2025-2027} = 0.55$, $F_{2028-2034} = 0.37$
4	$Catch_{2025-2027} = 2,400$ mt; $Catch_{2028-2034} = 2,150$ mt
5	$Catch_{2025-2027} = 2,250$ mt; $Catch_{2028-2034} = 2,175$ mt
6	$Catch_{2025-2027} = 2,400$ mt; $Catch_{2028-2032} = 2,225$ mt; $Catch_{2033-2034} = 2,100$ mt 120 cm EFL size limit with low release survival probability=0.2 ;
7	$Catch_{2025-2034} = 2,180$ mt 120 cm EFL size limit with low release survival probability=0.4 ;
8	$Catch_{2025-2034} = 2,185$ mt
9	$F = F_{MSY}$
10	$F = F_{status-quo}$ (2018-2020)

Table 2. Annual catch limits of each CCM.

CCM	Annual Catch Limit (mt)
Japan	1454.4
Chinese Taipei	358.4
Korea	214.8
United States	228.4
China	68.8
Total	2324.8