NPFC-2023-SC08-WP15 (Rev. 1)

Species Summary for Chub Mackerel

Chub mackerel (*Scomber japonicus*)

Common names:

鲐鱼, Taiyu (China)

マサバ, Masaba (Japan)

고등어, Godeungeo (Korea)

Японская скумбрия, Yaponskaya skumbriya (Russia)

白腹鯖, Bai-Fu-Qing (Chinese Taipei)

Management

Active NPFC Management Measures

The following NPFC conservation and management measure (CMM) pertains to this species:

- CMM 2023-07 For Chub Mackerel

Available from https://www.npfc.int/cmm-2023-07-chub-mackerel-effective-date-26-july-2023

Management Summary

The current conservation and management measure (CMM) for Chub mackerel does not specify catch or effort limits. The CMM states that Members and Cooperating non-Contracting Parties currently harvesting Chub mackerel should refrain from expansion of the number of fishing vessels authorized to fish Chub mackerel in the Convention Area.

A stock assessment for Chub mackerel is conducted by Japan in Northwest Pacific since 1997 and used for management of the domestic fishery.

Convention/Management Principle	Status	Comment/Consideration
Biological reference point(s)	🔴	The TWG CMSA agreed to base its future discussions on the following candidate biological reference points: (a) F-based reference points i. F_{MSY} ii. $F_{\%SPR}$ iii. $F_{0.1}$, F_{max} (b) Biomass-based reference points (including SSB, summary biomass, etc.) i. B_{MSY} ii. $\%B_0$ iii. Certain historical level of B
Stock status	⚪	Status determination criteria not established.
Catch limit	🔴	Not established
Harvest control rule	🔴	Not established.
Other	🟡	Encouragement to refrain from expansion, in the Convention Area, of the number of fishing vessels.

🟢 OK 🟡 Intermediate 🔴 Not accomplished ⚪ Unknown

Assessment

No stock assessment on Chub mackerel has been conducted by NPFC for the Convention Area so far. The Technical Working Group on Chub mackerel Stock Assessment (TWG CMSA) agreed to use a State-space Stock Assessment Model (SAM) for stock assessment of this species (TWG CMSA 2023). After data preparatory meeting, which will be held in January 2024, the Group will conduct its first stock assessment of Chub mackerel in 2024.

Japan conducts an assessment on the Pacific stock of Chub mackerel using tuned VPA (Yukami et al. 2023).

Data

Surveys

China has been conducting a five-year scientific survey program using its fishery research vessel "Song Hang" with mid-trawl as the main survey gear in the NPFC convention area from 2021 to 2025 (Ma et al. 2023).

Japan annually conducts two mid-water trawls surveys in summer (2001-2023) and autumn (1995-2023) that serve information on recruitment abundance indices of age-0 fish to the Japanese domestic stock assessment of the Pacific stock of Chub mackerel (Table 1) (Yukami et al. 2023). The autumn mid-water trawl survey also provides age-1 fish abundance indices for the stock assessment. Japan also conducts a year-round egg survey providing egg density as index of spawning stock biomass for the stock assessment. The survey protocol can be found at Oozeki et al. (2007).

Russia has conducted a summertime acoustic-trawl survey since 2010 that examines mid-water and upper epipelagic species including Chub mackerel.

Fishery

China, Japan and Russia catch Chub mackerel (Figure 1). China harvests this species dominantly by light purse seine fishery in the NPFC Convention Area. A smaller component of the catch is taken by pelagic trawl. Chinese catch statistics on mackerels in the NPFC Convention Area are available from 2015. The Chinese mackerel fisheries in the NPFC Convention Area initiated in 2014 mainly caught the three fish species such as Chub mackerel, blue mackerel, and Japanese sardine (Zhang et al. 2023). Blue mackerel catch accounts for 6% to 15.2%, about 10% on average, in the mackerels catch up to 2021. In 2022, the proportion increased to 22.5%.

Japan's fishery for Chub mackerel occurs inside their Exclusive Economic Zone (EEZ) and is mostly conducted by large purse seine vessels (≥50% of the catch). Additional components of the fishery include set nets, dip nets and other gears. Proportion of Chub mackerel catch in mackerels catch is obtained through extensive port sampling. The Chub mackerel catch accounts for 61% to 97%, 84% on average, of the mackerels catch in 2017-2021.

The Russian fisheries catching mackerels are operated in their EEZ and is prosecuted primarily by mid-water trawling (>90% of the catch), with a smaller component of the catch coming from purse seiners and bottom trawlers. The Russian mackerels catch, comprising approximately 100% of Chub mackerel, are available in the NPFC Annual Summary Footprint since 2014.

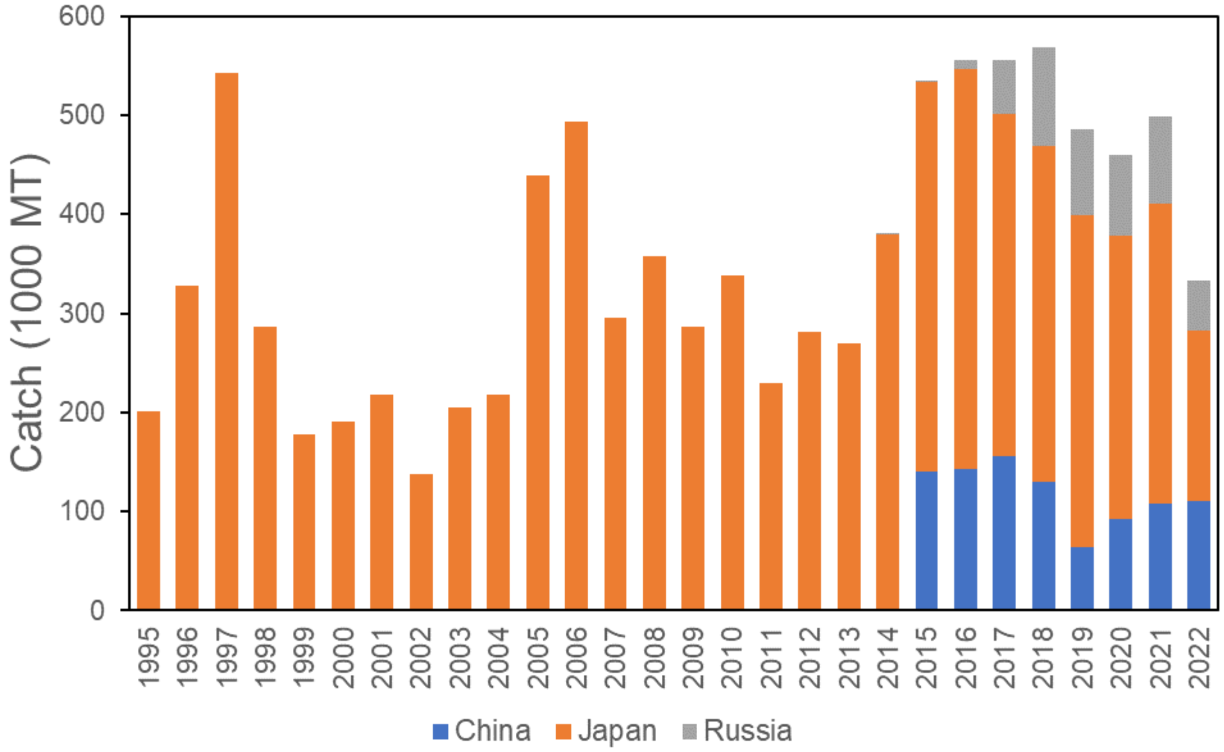

Figure 1. Historical catch of mackerels obtained from annual summery footprint of Chub and Blue mackerels.

Other NPFC Members (Canada, EU, Korea, Chinese Taipei, USA and Vanuatu) do not have Chub mackerel catch records in the NPFC Convention Area.

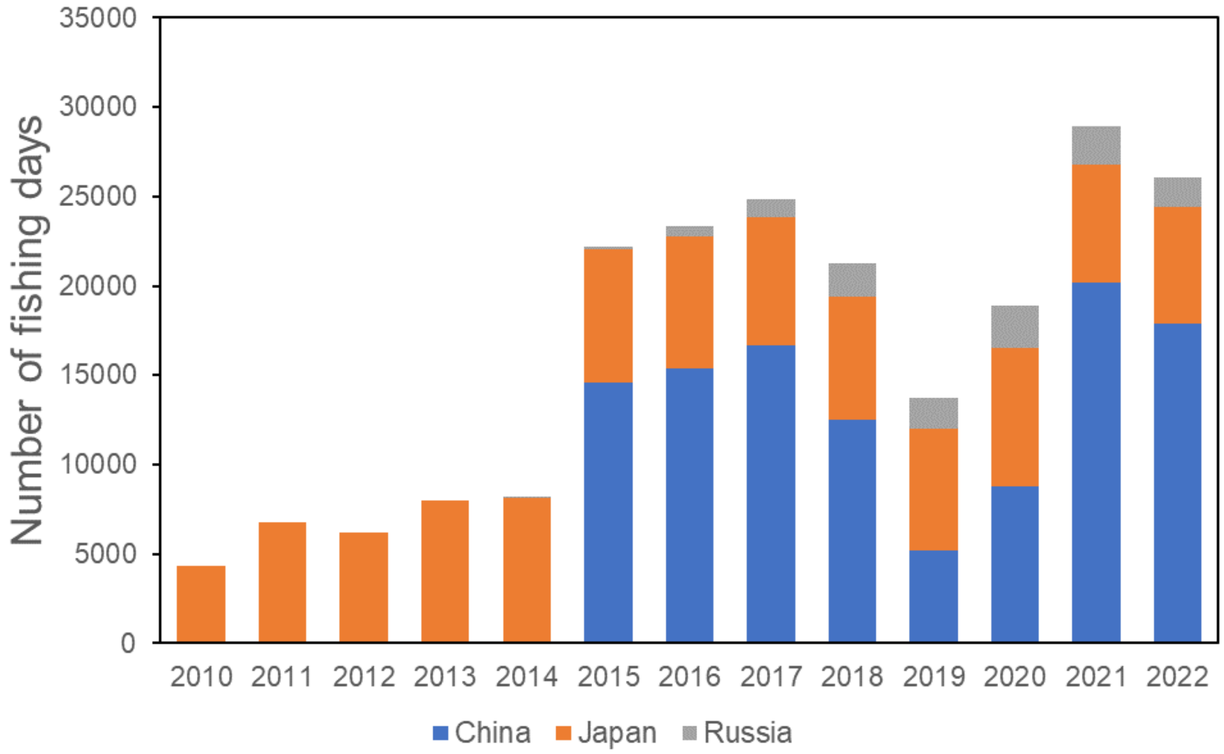

Figure 2. Historical fishing effort for mackerels obtained from annual summary footprint of Chub and Blue mackerels.

Biological collections

China has collected length frequency data of commercial catch through onboard and port samplings since 2016. Aging of the samples has been started since 2017.

Japan also collects length, weight, maturity and age data from the survey and fishery to support their stock assessment.

Russian length frequency and aging data of commercial catch are available since 2016. The length frequency data obtained through research surveys are available since 2010.

Table 1: Data availability from Members regarding Chub mackerel.

Category and data sources	Description	Years with available data	Average sample size/year or data coverage	Potential issues to be reviewed
JAPAN				
Catch statistics				
Purse seine fishery	Official statistics, reports from fisheries associations and markets	Official statistics: 1950-2022, other reports: 1970-2022	Coverage=100%	The Chub mackerel catches are estimated from Chub and blue mackerel catches based on port sampling data for purse seine and set net fisheries. No detailed information of the ratio is presented.
Dip net fishery				
Set net				
Size composition data				
Length measurements	Port sampling by 17 local fishery institutes in 17 prefectures	1970-2022	20,000-120,000 (average 40,000) fish/year (ca. 100 measurements per sampling)	Detailed information in NPFC-2020-TWG CMSA03-WP02.
Aging	Port sampling by 17 local fishery institutes in 17 prefectures	1970-2022	500-1000 fish/year	Detailed information in NPFC-2020-TWG CMSA03-WP02.
Catch at age (CAA)	Estimate CAA from the above data	1970-2022	Age-length keys are created approximately by quarter and local regions	Evaluate uncertainty of catch at age; Changes of growth depending on recruitment abundance is

				reviewed in NPFC-2022-TWG CMSA05-IP06 and published as Kamimura et al (2022, https://doi.org/10.1093/icesjms/fsab191)
Abundance indices (survey)				
Spring survey for recruitment	Mainly for sardine and Chub mackerel of pre-recruits. This research is conducted for biological research of early life history. Mid-water trawl	1995-2022	30-60 stations/year	Too early for the use of abundance index
Summer survey for recruitment	Mainly for saury, mid-water trawl	2001-2022	60-80 stations/year	Detailed information on data and standardization is in NPFC-2022-TWG CMSA06-WP11 (Rev.1). Detailed sampling design and method are shown in Hashimoto et al. (2020, https://doi.org/10.1007/s12562-020-01407-3).
Autumn survey for recruitment and age 1 fish	Mainly for sardine and Chub mackerel, mid-water trawl	1995-2022	30-60 stations/year	Detailed information on data and standardization for recruitment is in NPFC-2022-TWG CMSA06-WP11 (Rev.1). That for

				age 1 has not been presented.
Year-round for egg density	Almost all local fishery institutes join this survey program. NORPAC net. Not only for Chub mackerel.	1978-2022 (2005-, species identification between Chub and blue mackerel)	ca. 6000 stations in total, 1000-4000 stations with Chub mackerel eggs/year	Detailed information on data and standardization is in NPFC-2022-TWG CMSA06-WP10
Abundance indices (commercial)				
Dip net fishery	Log book data are collected from fishermen in Kanagawa prefecture since 2003 and Shizuoka prefecture since 2013 (ca. 10 and 90% of total dip net catch in 2017, respectively)	2003-2022	10-100/year	Detailed information on its data and standardization is in NPFC-2022-TWG CMSA06-WP09
RUSSIA				
Catch statistics				
Purse seine fishery Pelagic trawl fishery	Official statistics, reports from fisheries associations	Official statistics: 1980-1993, 2015-2022, 1994-2014 (no data available); publications: 1970-2022	Coverage 1980-1993 ?%; Coverage 2015-2022 =100%	Data coverage details to be reviewed
Size composition data				
Length measurements	Sampling from commercial fishing vessels. Sampling during research surveys.	2016-2022 2010-2022	1,000-10,000 fish/year (ca. 100 measurements per sampling)	Data coverage details to be reviewed
Aging	Sampling during	2016-2022	300-500	Details to be

	research surveys and from commercial fishing vessels		fish/year	reviewed
Catch at age (CAA)	Estimate CAA from the above data	2016-2022	Age-length keys are to be developed	Evaluate uncertainty of catch at age, especially on changes of growth depending on recruitment abundance
Abundance indices (survey)				
Summer trawl and acoustic (echointegration) surveys to assess pelagic fish abundance and recruitment	Mid-water upper epipelagic surveys	2010-2022 (June-July) 2015-2022 (July-August)	60-80 stations/year 60-80 stations/year	Changes in abundance and migration patterns; development survey protocol and conduct standardization
Abundance indices (fishery)				
Daily reports of catch by each vessel	Target (>50%) Mid-water trawls	2015-2022 September-December		Test the effect of targeting
CHINA				
Catch statistics				
Purse seine fishery	Official statistics, reports from annual report	Official statistics：2014-2022	Coverage=100%	The Chub mackerel catches are from the fishing catch provided by the fishery company
Trawl fishery	Official statistics, reports from annual report	Official statistics: 2014-2022	Coverage=100%	Catches are from the fishing catch provided by the fishery company
Size composition data				
Length	Port sampling by	2016-2022	550-800	Details to be

measurements	Institute and technology group.		fish/year	reviewed
Length measurements	Purse seine vessel sampling from commercial vessel	2016-2022	530-1050 fish/year	Details to be reviewed
Aging	Sampling during research surveys and from commercial fishing vessels	2017-2022	30-180 fish/year	Details to be reviewed
Abundance indices (commercial)				
Purse seine fishery	Purse seine logbook (Technical group for Chub mackerel Fishery, Distant-water Fishery Society of China)	2014-2022 April-November	10-105/year	Review survey protocol and conduct standardization

Special Comments

None

Biological Information

Distribution

The Pacific stock of Chub mackerel is distributed from the southern coastal waters on the Pacific side of Japan to offshore area off the Kuril Islands (Figure 3). This stock corresponding to straddling one is harvested in both national waters of Japan and Russia and the NPFC Convention Area. Adult fish spawn in Izu Islands waters in spring and then engage northward feeding migration to waters of Sanriku to east Hokkaido from summer to autumn.

Life history

Longevity of Chub mackerel is estimated to be 7 or 8 years old. There was the oldest record of 11 years old. It is known that growth of this stock could be changed according to recruitment abundance and oceanic environment (Watanabe and Yatsu 2004). Recent decrease in mean weight by age was highly likely induced by feeding competition in conjunction with intra-/inter-specific increase of density resulted from biomass increases of Chub mackerel and Japanese sardine (Kamimura et al. 2021). Adult female spawns more than once during a spawning season. Maturity at age was changed depending on changes in growth (Watanabe and Yatsu 2006).

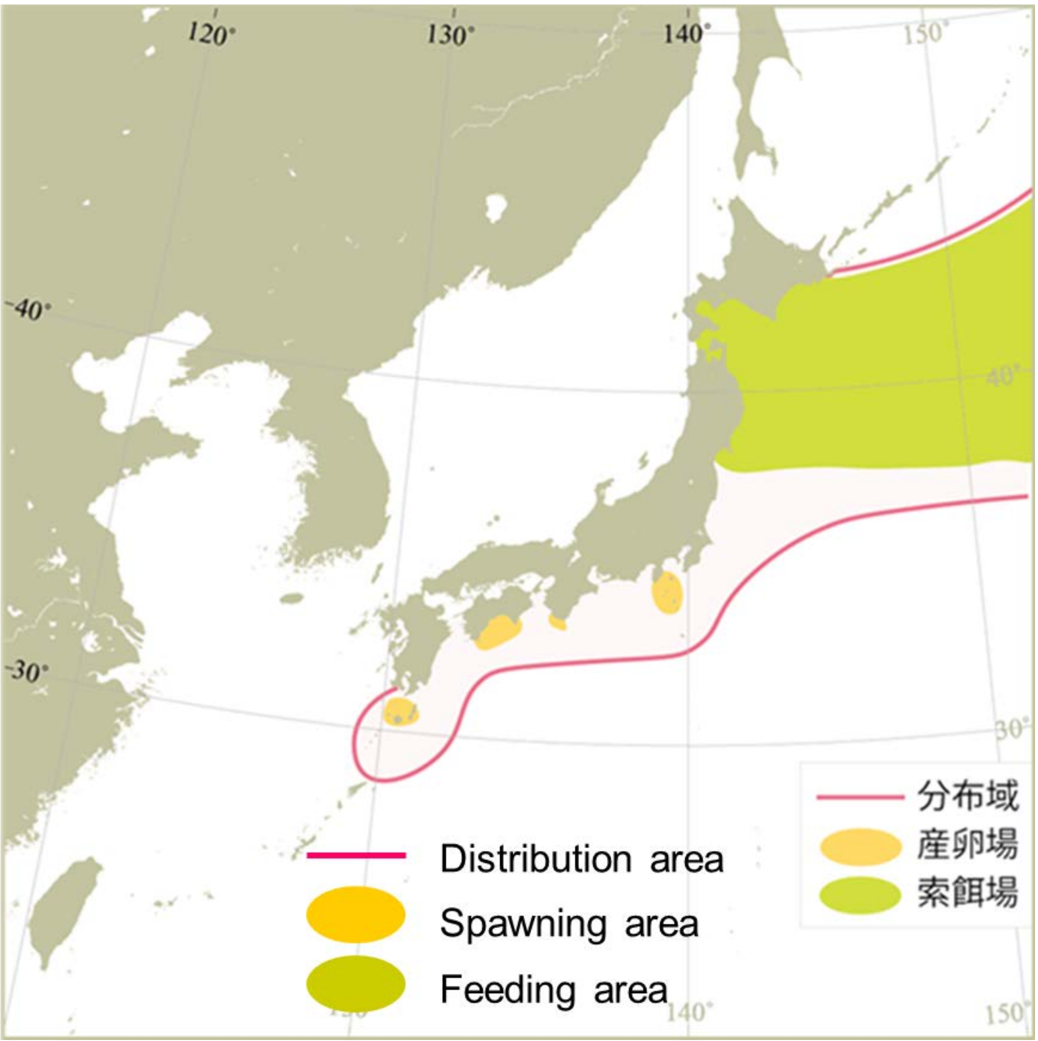

Figure 3. Map of distribution of Chub mackerel in the North Pacific (Yukami et al. 2023)

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