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NPFC-2025-SC10-WP20

An overview of 2025 Chinese survey by fishery research vessel "Song Hang" in the NPFC convention area

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Summary

In 2025, the Chinese fishery research vessel Song Hang embarked on its fifth year of scientific surveys by Shanghai Ocean University in the Northwest Pacific Ocean. This document provides an overview of the 2025 survey. The improved survey program in 2025 continues to cover fisheries resources, larval and juvenile stages of marine species, plankton, and environmental surveys, consistent with previous years. Based on the five-year survey, we are conducting a series of research studies to support the stock assessment and management of Chub mackerel, Blue mackerel, Japanese sardine, and Neon flying squid in NPFC. Research areas include biological parameters (such as growth and mortality), standardization of abundance indices, biodiversity, and ecosystem modeling. The resulting outputs will be submitted to specific working group or SSC of each priority species.



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Introduction

Shanghai Ocean University of China has been conducting a scientific survey program using its fishery research vessel "Song Hang" of in the NPFC convention area since 2021. This comprehensive program includes fisheries resources, larval-juvenile, plankton, and environmental surveys, with the tasks as below:

- a) Investigating population structure and spatial distribution of pelagic species.
- b) Evaluating the relative abundance of NPFC species based on the trawl and acoustic data.
- c) Collecting fishery-independent data, including length-frequency, length-weight data, and biological sampling of the main species in this ecosystem.
- d) Collecting environment data and biology diversity for ecosystem modeling.

Through this project, we look forward to providing essential information to supplement the current scientific database of the SC and its subsidiary bodies to improve our understanding of the marine ecosystem in NPFC convention area.

Materials and Methods

Given the capacity and schedule of the "Song Hang" research vessel (3166 tons, 85-meters-length), we surveyed about two months from mid-June to mid-August. In 2025, the program conducted from 12 June to 17 August, with 67 surveying days. This survey covered the area from 148°E to 168°E and from 35°N to 45°N on the high sea (Figure 1). This survey includes the fishery resources mid-trawling, squid jigging, egg-larva-juvenile trawling, zooplankton and phytoplankton vertical trawling, environmental factors monitoring, acoustic survey, and environment-DNA research.

Totally there are about 94 stations in 2025, with trawling for only 56 stations and squid-jigging for 38 stations (Figure 1). At each station, the mid-trawling covers about 2~3 hours, with 4~5 kn speed and the squid jigging for 5 hours. The catch was identified to species level, weighted, counted, and some important specimens will be measured for the biological information (growth, sex, maturity, feeding etc.)

For environment factors, we collect data on temperature, salinity, transparency,



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dissolved oxygen, pH, nitrogen, etc. Conductivity Temperature Depth (CTD 9-11Plus, Sea-Bird) and its MOUNTED SBE43 probe was used to collect 0-300m vertical hydrological data of the above information at each station. Water samples were collected in layers of 25m, 50m, 75m, 100m, 200m, and 300m, and 12 bottles *250ml/ bottle per station, used for multiple purposes, e.g. environment-DNA analysis.

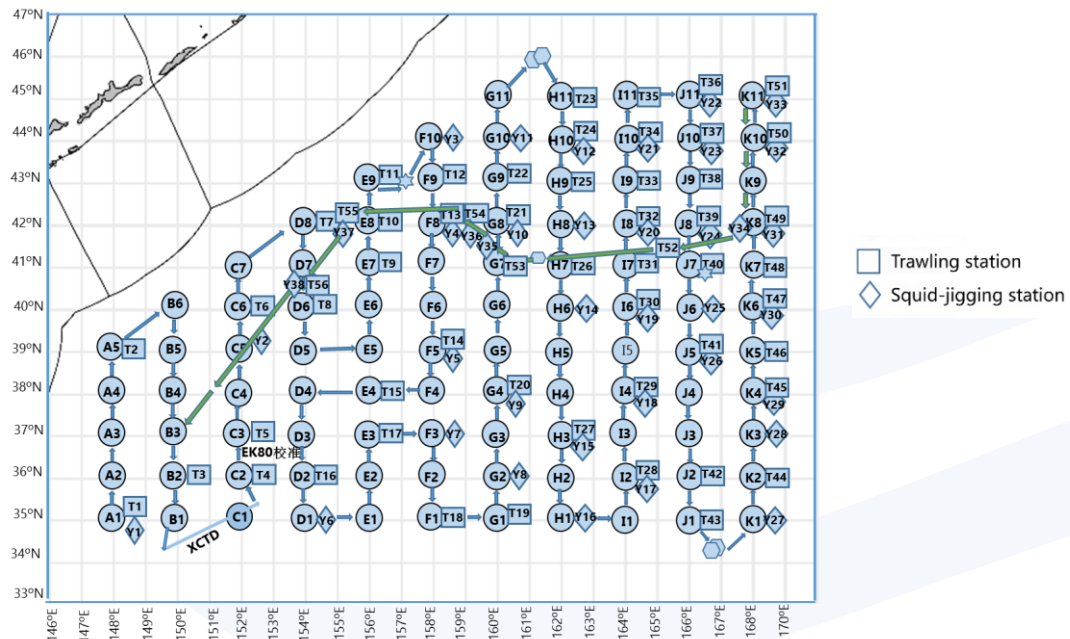


Figure 1 Survey stations of RV Song Hang in the northwest Pacific Ocean in 2025.

Results

The trawling and squid jigging surveys collected many species, which are mainly fishes and cephalopoda (Tables 1-2). The number of fish species collected from 2021 to 2025 was 18, 17, 46, 55, and 39, respectively, while the number of cephalopod species was 11, 14, 12, 11, and 11.

In both 2023 and 2024, the dominate fishery species in trawling surveys were Chub mackerel (*Scomber japonicus*) and Japanese Sardine (*Sardinops melanostictus*), with Blue mackerel (*Scomber australasicus*) ranking third in catch weight and abundance proportion in 2024. By 2025, Blue mackerel had become the most dominant species in the catch. The second and third most abundant species were Bigfin lanternfish (*Symbolophorus californiensis*) and Chub mackerel, respectively,



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while the proportion of Japanese Sardine declined significantly (Figure 2). Over the three-year period from 2023 to 2025, Neon flying squid (*Ommastrephes bartramii*) consistently accounted for the largest proportion in both catch weight and abundance. In 2025, Purpleback flying squid (*Sthenoteuthis oualaniensis*) ranked second in the catch (Figure 3). Whether mackerels or Japanese sardine, the catch of both declined between 2021 and 2025, and their spatial distribution became increasingly dispersed (Figures 4-5).

By analyzing the length-frequency distributions of Chub Mackerel and Blue Mackerel across different sampling times (Figure 6), the population structure of Chub Mackerel shifted from initially being dominated by smaller individuals to progressively being dominated by medium-length groups from June to August. In contrast, the length distribution of Blue Mackerel remained relatively stable across all sampling periods. Japanese Sardine exhibited notable interannual variations in both sampling timing and population structure (Figure 7), with the dominant length group shifting from 75-160 mm in 2021 to a broader range of 90-250 mm by 2024. Neon flying squid consistently exhibited a mantle length concentrated between 150-300 mm across all years (Figure 8).

Using the swept-area method to calculate the relative density of three economic fish species in the Northwest Pacific, the results are as follows: the relative densities in 2025 of Chub mackerel, Blue mackerel, and Japanese sardine are 20.29, 117.86, and 2.11 kg/km². Through the acoustic analysis, the density of Chub mackerel was estimated to be 20.99 t/nmi², while Blue mackerel's density was 82.59 t/nmi², and the Japanese sardine was 1.37 t/nmi².

Table 1 The fishes collected in the five years fishery resources survey by RV Song Hang in the northwest Pacific.

Family	Species	2021	2022	2023	2024	2025
ANOPTERIDAE	<i>Anopterus nikparini</i>					√
BATHYLAGIDAE	<i>Dolicholagus longirostris</i>			√		
	<i>Lipolagus ochotensis</i>			√	√	√
BRAMIDAE	<i>Brama brama</i>			√	√	√



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Family	Species	2021	2022	2023	2024	2025
	<i>Brama japonica</i>		√	√	√	√
	<i>Brama myersi</i>	√	√	√	√	
	<i>Taractes rubescens</i>		√			
BOTHIDAE	<i>Bothidae</i>				√	
CARANGIDAE	<i>Trachurus japonicus</i>				√	
	<i>Decapterus lajang</i>				√	
	<i>Naucrates ductor</i>				√	
CARCHARHINIDAE	<i>Prionace glauca</i>	√	√	√	√	√
CARISTIIDAE	<i>Caristius macropus</i>					√
CENTROLOPHIDAE	<i>Hyperoglyphe japonica</i>			√	√	
	<i>Lcichthys lockingtoni</i>				√	√
CLUPEIDAE	<i>Sardinops melanostictus</i>	√	√	√	√	√
DALATIIDAE	<i>Squaliformesv</i>				√	√
DASYATIDAE	<i>Pteroplatytrygon violacea</i>	√				
EMMELICHTHYIDAE	<i>Erythrocles schlegelii</i>				√	
ENGRAULIDAE	<i>Engraulis japonicus</i>	√	√	√	√	√
EXOCOETIDAE	<i>Cypselurus oligolepis</i>			√		
GEMPYLIDAE	<i>Gempylus serpens</i>					√
	<i>Nealotus tripes</i>	√	√	√	√	√
GONOSTOMATIDAE	<i>Diplophos taenia</i>				√	
ICOSTEIDAE	<i>Icosteus aenigmaticus</i>			√		
LAMNIDAE	<i>Lamna nasus</i>			√	√	
LAMPRIDIDA	<i>Lampris guttatus</i>			√		
LOPHIIDAE	<i>Lophius litulon</i>				√	
MOLIDAE	<i>Mola mola</i>		√	√		√
MONACANTHIDAE	<i>Thamnaconus septentrionalis</i>				√	
MYCTOPHIDAE	<i>Ceratoscopelus townsendi</i>			√	√	√
	<i>Diaphus garmani</i>	√				
	<i>Diaphus gigas</i>			√	√	√
	<i>Diaphus theta</i>					√
	<i>Diaphus perspicillatus</i>			√	√	√
	<i>Diaphus suborbitalis</i>			√		
	<i>Hygophum reinhardtii</i>				√	
	<i>Lampanyctus tenuiformis</i>			√		
	<i>Myctophidae</i>		√		√	
	<i>Myctophum asperum</i>	√	√	√	√	√
	<i>Myctophum nitidulum</i>	√		√	√	√
	<i>Nannobranchium nigrum</i>			√		
	<i>Notoscopelus caudispinosus</i>			√	√	
	<i>Notoscopelus japonicus</i>			√	√	√
	<i>Notoscopelus resplendens</i>	√		√	√	√



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Family	Species	2021	2022	2023	2024	2025
	<i>Poropanchax normani</i>			√		
	<i>Symbolophorus californiensis</i>	√		√	√	√
	<i>Symbolophorus evermanni</i>				√	
	<i>Tarletonbeania taylori</i>			√	√	√
NEMICHTHYIDAE	<i>Nemichthys scolopaceus</i>				√	√
NEOCERATIAS	<i>Ceratias holboelli</i>				√	
NOMEIDAE	<i>Cubiceps whiteleggii</i>		√	√		
	<i>Cubiceps pauciradiatus</i>				√	
	<i>Psenes arafurensis</i>			√	√	
	<i>Psenes pellucidus</i>		√	√		
	<i>Psenes cyanophrys</i>				√	
NOTOSUDIDAE	<i>Scopelosaurus hoedti</i>	√		√	√	√
OSTRACIONTIDAE	<i>Lactoria diaphana</i>			√		
PARALEPIDIDAE	<i>Lestidiops jayakari</i>			√		
	<i>Lestrolepis intermedia</i>			√		√
	<i>Magnisudis indica</i>	√				
	<i>Stemonosudis</i>				√	
	<i>Stemonosudis macrura</i>					√
	<i>Stemonosudis rothschildi</i>					√
PHOSICHTHYIDAE	<i>Vinciguerria nimbaria</i>				√	
REGALECIDAE	<i>Regalecus glesne</i>					√
	<i>Regalecus russlii</i>		√			
SALMONIDAE	<i>Oncorhynchus gorboscha</i>			√		
	<i>Oncorhynchus keta</i>					√
SCOMBERESOCIDAE	<i>Cololabis saira</i>	√			√	√
SCOMBRIDAE	<i>Diplospinus multistriatus</i>			√	√	
	<i>Katsuwonus pelamis</i>					√
	<i>Scomber australasicus</i>	√		√	√	√
	<i>Scomber japonicus</i>	√	√	√	√	√
	<i>Thyrsitoides marleyi</i>			√	√	
STOMIAS AFFINIS	<i>Astronesthes fedorovi</i>				√	
	<i>Astronesthes quasiindicus</i>			√		
STOMIIDAE	<i>Stomias affinis</i>					√
TETRAGONURIDAE	<i>Tetragonuridae</i>				√	
	<i>Tetragonurus cuvieri</i>		√	√	√	
TETRAODONTIDAE	<i>Arothron stellatus</i>				√	
	<i>Lagocephalus lagocephalus</i>				√	
TRACHIPTERIDAE	<i>Trachipteridae</i>				√	
	<i>Tradhypterus ishikawae</i>		√	√	√	√
	<i>Zu cristatus</i>					√
TRICHIURIDAE	<i>Assurger anzac</i>	√				



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Family	Species	2021	2022	2023	2024	2025
	<i>Benthodesmus tenuis</i>					√
THUNNIDAE	<i>Auxis thazard thazard</i>				√	
XIPHIIDAE	<i>Xiphias gladius</i>			√		
ZEIDAE	<i>Zenopsis nebulosa</i>	√	√	√	√	√



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Table 2 The cephalopoda collected in the five years fishery resources survey by RV Song Hang in the northwest Pacific.

Family	Species	2021	2022	2023	2024	2025
ALLOPOSIDAE	<i>Haliphron atlanticus</i>		√			
AMPHITRETIDAE	<i>Amphitretus pelagicus</i>	√	√			
	<i>Vitreledonella richardi</i>					√
ARGONAUTIDAE	<i>Argonauta argo</i>				√	
BOLITAEMIDAE	<i>Japetella diaphana</i>	√	√		√	
CRANCHIIDAE	<i>Cranchia scabra</i>			√		
	<i>Galiteuthis sp.</i>		√			
	<i>Leachia pacifica</i>			√		
	<i>Liocranchia reinhardtii</i>		√	√		
	<i>Taonius pavo</i>			√		
ENOPLOTEUTHIDAE	<i>Enoploteuthis chunii</i>			√	√	√
	<i>Watasenia scintillans</i>	√	√	√	√	√
GONATIDAE	<i>Gonatopsis borealis</i>	√	√	√	√	√
	<i>Gonatopsis octopedatus</i>	√	√			
OCTOPOTEUTHIDAE	<i>Octopoteuthis sicula</i>			√		
OMMASTREPHIDAE	<i>Eucleoteuthis luminosa</i>	√	√	√	√	√
	<i>Ornithoteuthis volatilis</i>				√	√
	<i>Ommastrephes bartrami</i>		√		√	√
	<i>Sthenoteuthis oualaniensis</i>	√				
	<i>Todarodes pacificus</i>	√	√	√		√
ONYCHOTEUTHIDAE	<i>Moroteuthis</i>			√	√	√
	<i>Moroteuthis robusta</i>	√	√			
	<i>Onychoteuthis borealijaponicus</i>	√	√		√	√
	<i>Onychoteuthis compacta</i>	√	√	√	√	√



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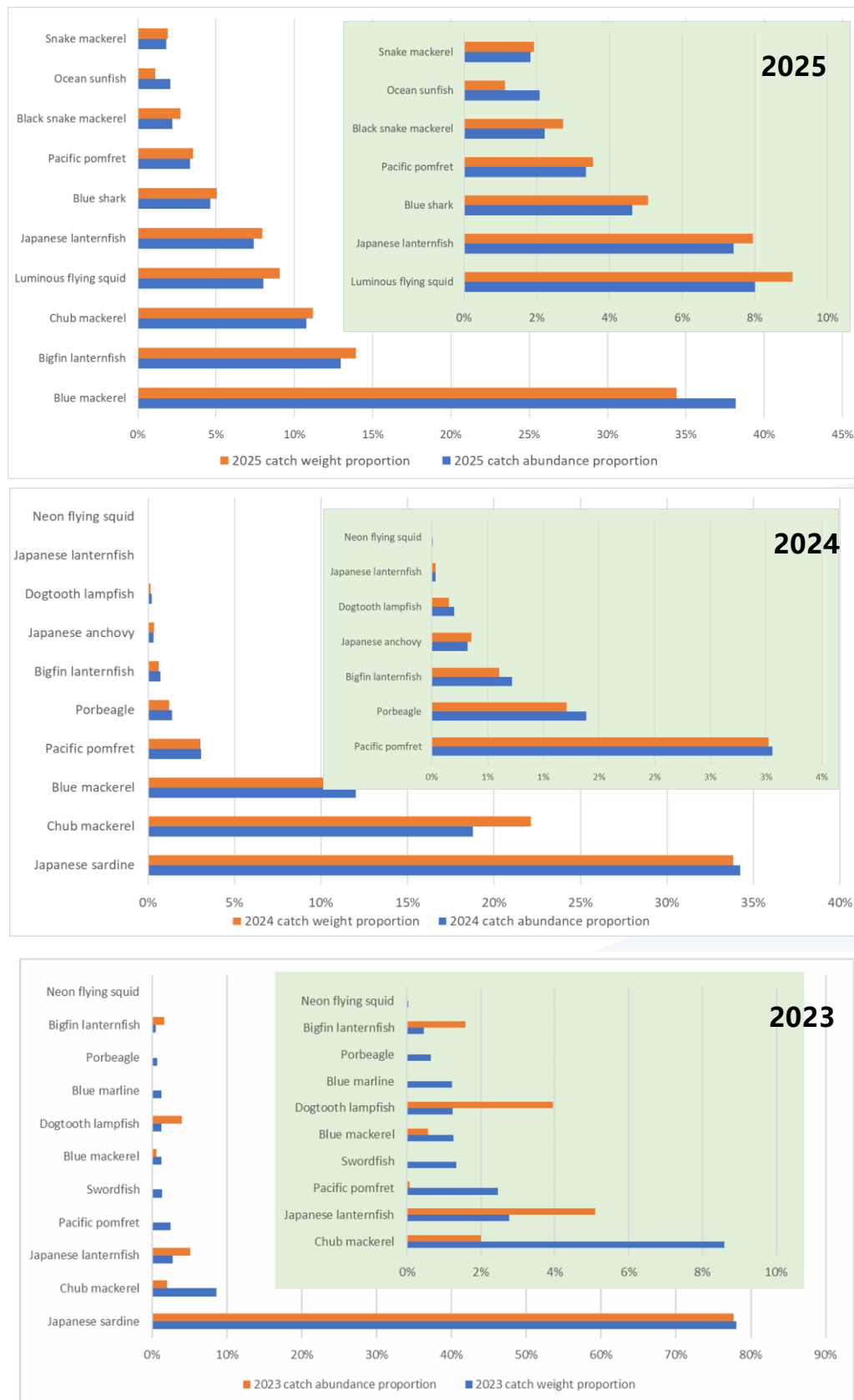


Figure 2 The catch weight and abundance proportions of main species in 2023-2025 trawling survey.



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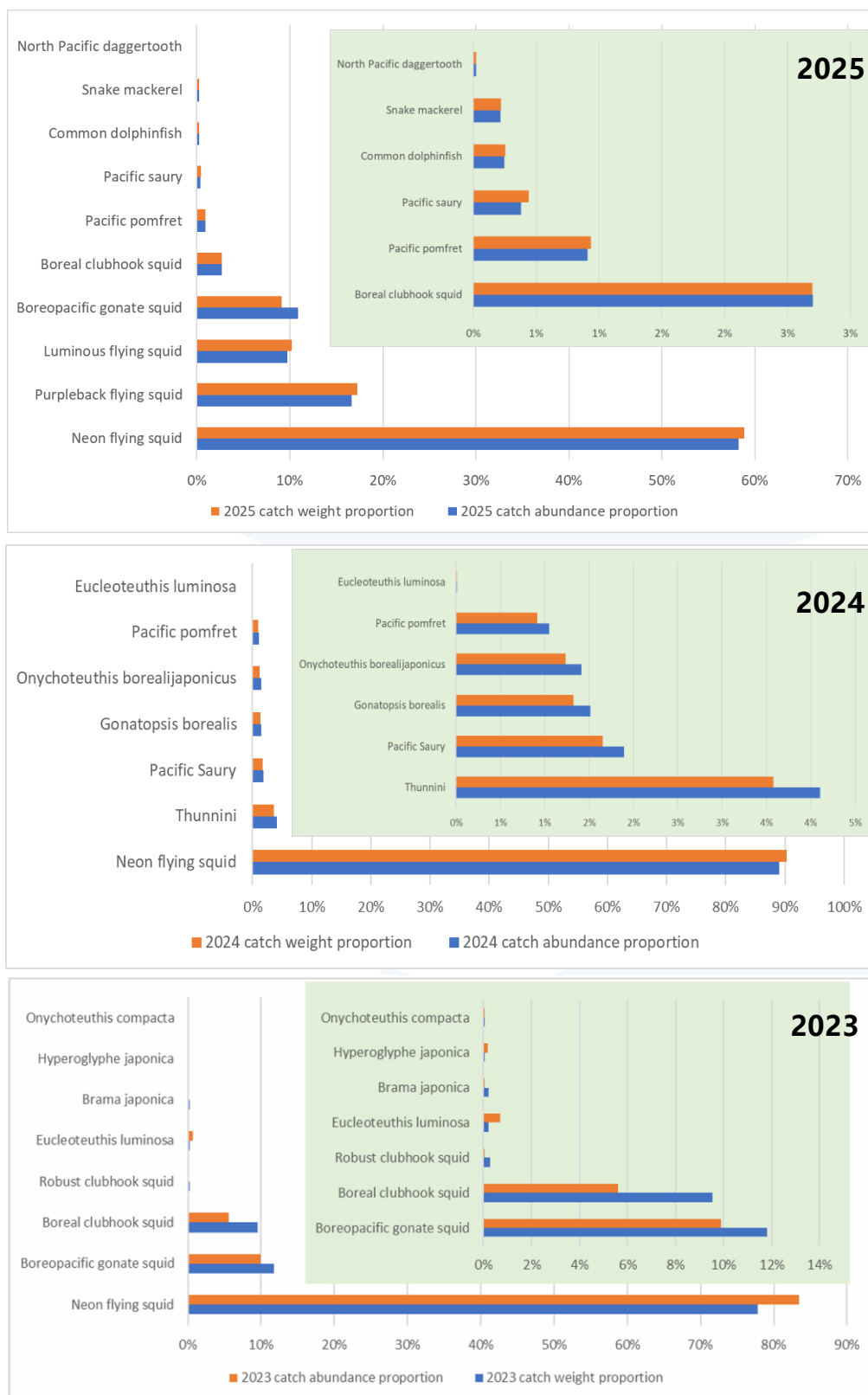


Figure 3 The catch weight and abundance proportions of main species in 2023-2025 squid jigging survey.



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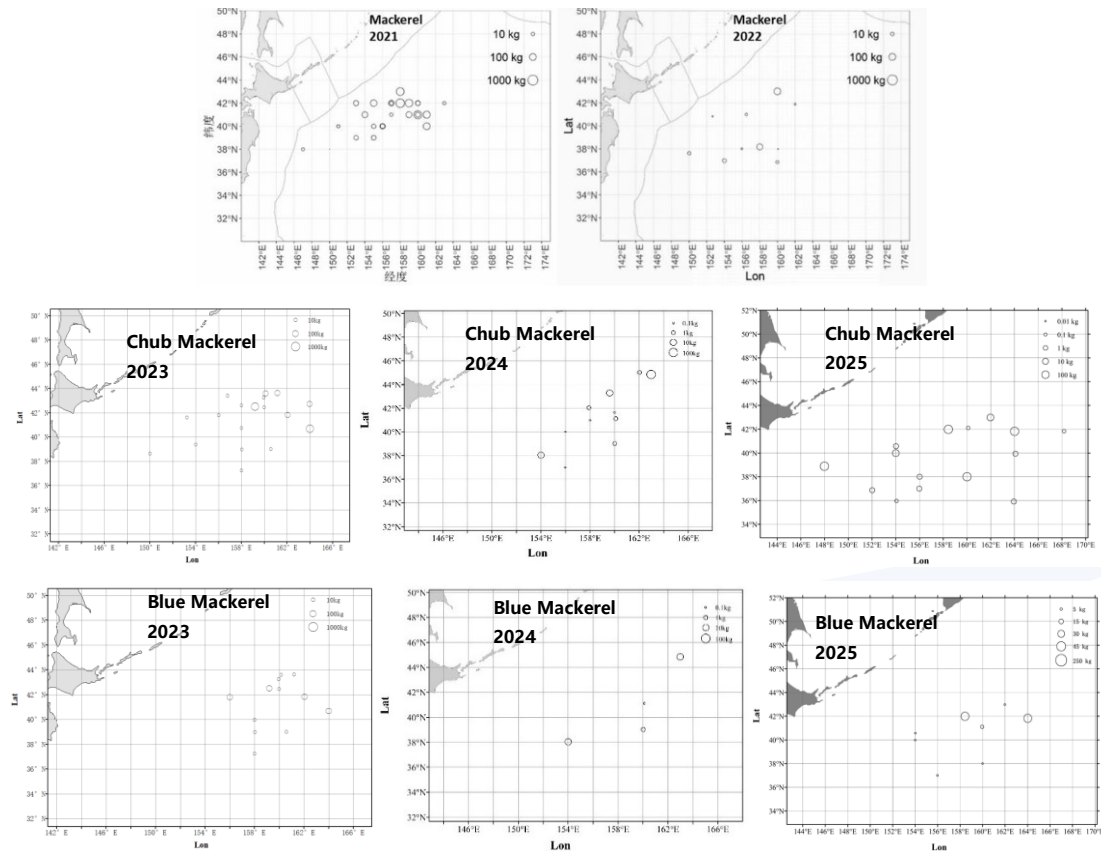


Figure 4 The catch distribution of mackerels in the five years by RV Song Hang in the northwest Pacific.

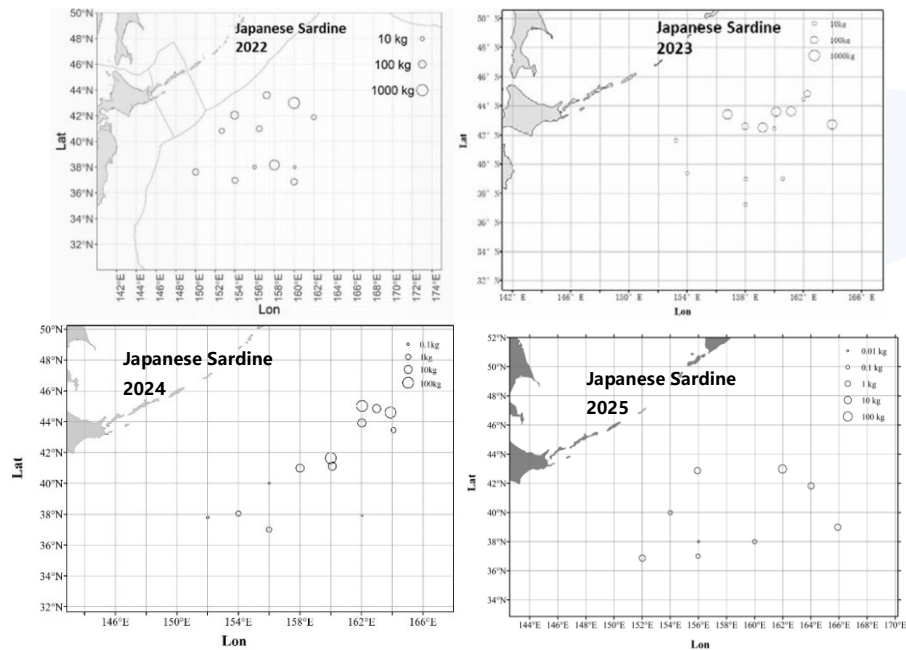


Figure 5 The catch distribution of Japanese sardine in the five years by RV Song Hang in the northwest Pacific.



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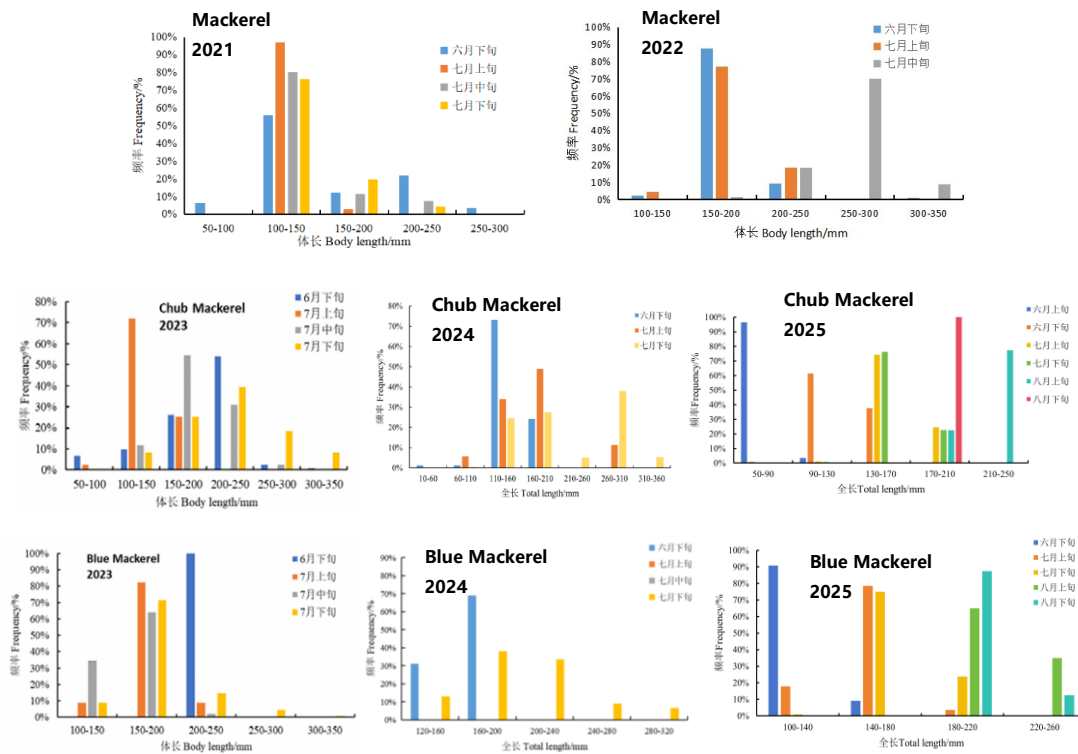


Figure 6 The length distribution of mackerels surveyed in the five years fishery resources survey by RV Song Hang in the northwest Pacific.

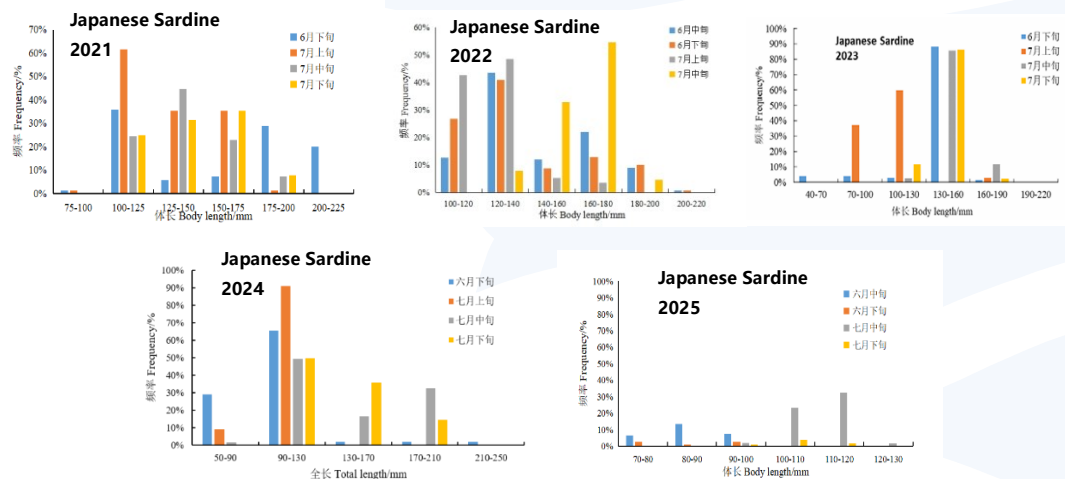


Figure 7 The length distribution of Japanese sardine surveyed in the five years fishery resources survey by RV Song Hang in the northwest Pacific.



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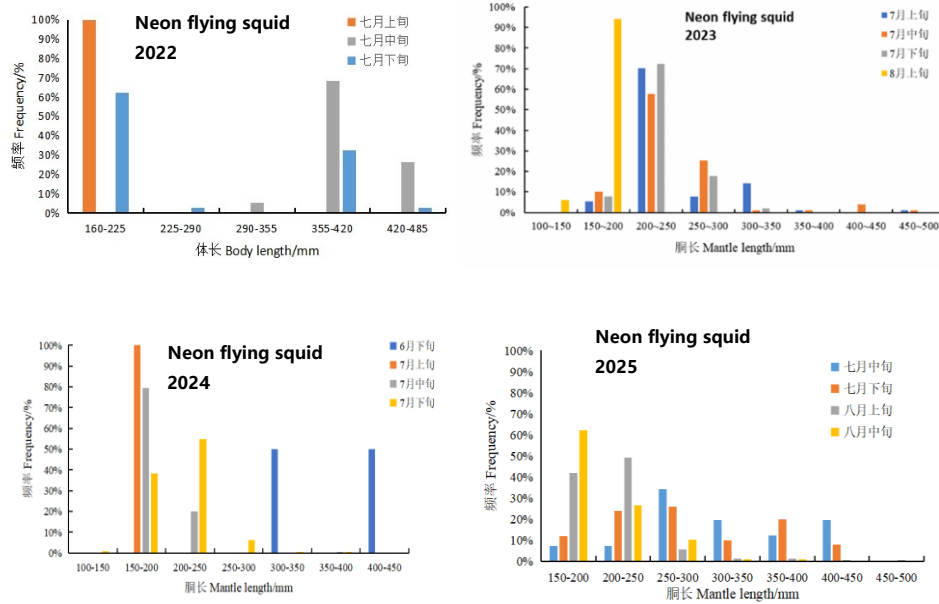


Figure 8 The length distribution of Neon flying squid surveyed in the five years fishery resources survey by RV Song Hang in the northwest Pacific.



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Discussion

In 2025, 50 species were surveyed alongside environmental parameters using various advanced methodologies. The survey focused on key species such as Chub mackerel, Blue mackerel, Japanese sardine, and Neon flying squid, which are of high priority for the NPFC. These species were extensively studied to understand their spatial distribution, abundance, and biological characteristics, contributing to the scientific database required for effective fisheries management. However, due to the limitations of the survey gear and the capacity of the RV Song Hang, some species, such as Pacific saury and Japanese flying squid, were less frequently collected. Despite these challenges, the survey provided critical insights into the population structure and ecological roles of the primary target species.

In addition to species-specific data, the survey collected fundamental biological samples and environmental data, including water temperature, salinity, dissolved oxygen, and nutrient concentrations. These data are pivotal for studying life history traits, population dynamics, spatial and temporal distribution, feeding ecology, interspecies relationships, and community structure. Advanced techniques, such as molecular analysis and acoustic surveys, further enriched the dataset, enabling detailed assessments of trophic dynamics and habitat associations. The incorporation of environmental DNA (eDNA) analysis also allowed for the identification of species diversity beyond traditional trawling methods, expanding the understanding of biodiversity in the surveyed region.

The findings presented here are part of an ongoing series of investigations conducted during scientific surveys in the Northwest Pacific. These studies aim to deepen the understanding of marine ecosystems, addressing key issues such as biodiversity, trophic dynamics, and environmental impacts. While this work involves marine plastic contamination and pelagic ecosystem, subsequent research will continue to explore related themes, expanding the scope of knowledge.



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