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PROGRESS REPORT OF THE RESEARCH SURVEY FOR 2025 BY CHINESE FISHERY RESEARCH VESSEL "SONG HANG" IN THE WCPFC AREA

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Summary

China as a member country has been conducting a five-year scientific survey program using its fishery research vessel "Song Hang" with longline as the main gear in the WCPFC convention area from 2021 to 2025. The survey has collected fundamental data and biological tissue samples to improve the commission's scientific research to support better management advice. The main objectives of our cruises are to improve the understanding of the stock structure and investigate the mechanisms of moving and aggregating by incorporating environmental factors for target and bycatch species. The survey covered the area in the high sea from 128°95′E to 154°00′E and 11°79′ N to 17°35′N between September to November 2025. A total of 40 sets (15117 hooks) were released, and a total of 23 species were recorded in this survey. Preliminary result shows that harvest consists of Snake mackerel (19.6%) and Longnose lancetfish (18.9%). Bigeye tuna is the majority catch of commercial tuna. A total of 19 tags with satellites were released, and tissues sample of 215 individuals from 23 species were collected during the cruises.

Introduction

According to WCPFC Convention principles "on the need to collect and share data, including information from national research programs"(Article 5) and "The function of promoting the conduct of relevant scientific research and disseminating the results thereof is one of the functions of the Commission" (Article 10), China as a member country of WCPFC has conducted a five-year scientific survey program using its fishery research vessel "Song Hang" with longline as main gear in the WCPFC convention area. This series of research surveys are supported by the Ministry of Agriculture and Rural Affairs (MARA) of China and conducted by Shanghai Ocean University, focusing on the tuna and bycatch resource in the WCPFC convention area. Through this project, we look forward to providing essential information to supplement the current scientific database of the commission. We also hope that the survey will be a joint project with participants from SPC and other member scientists in the future.

The main objective of this project is based on various CMMs and recommendations raised by SC, including support and encouragement for CCMs to undertake scientific research to understand fisheries and species covered by the Convention. The survey will be conducted to collect fundamental data and conduct experiments to improve the commission's scientific research and support better management advice. Five tasks

would be included in this project, which are as below:

a) Collecting fishery-independent data, including catch and effort, length-frequency, length-weight data (to estimate various conversion factors), and biological sampling (larvae survey, growth, stomach content, etc.).
b) Investigating stock structure (tissue bank) and spatial distribution of longline target and bycatch species.
c) Investigating the influence of different types of longline hooks and baits on fishing selectivity, catchability, and survival rate onboard.
d) Collecting environment data for ecosystem model, including temperature, salinity, transparency, dissolved oxygen, pH, nitrogen, et al.
e) Tagging and releasing experiments for sharks, marine mammals, and turtles if possible. The project would also be used to monitor bycatch migration and releasing mortality.

Methods and materials

Given the capacity and schedule of the "Song hang" research vessel, we surveyed from Sep to Nov of 2025. This survey covered the area from 128°95′E to 154°00′E and 11°79′ N to 17°35′N on the high sea. This survey included 40 survey stations, 18 of which were used only for environmental surveys without fishing operations. A total of 45 fishing sets (5 for trawl net and 40 for longline) were included in this survey, and a total of 15117 hooks were released in the WCPO (Table 1). For more details about spatial distribution, please refer to Figure 1. For more details about the spatial distribution of catches in the survey area, please refer to Figures 2–5. Figure 2 shows the spatial distribution of total catch in the survey area, while Figures 3–5 show the spatial distributions of bigeye tuna, yellowfin tuna, and albacore tuna catches, respectively.

For the requirement of environment data for the ecosystem model, we will collect data on temperature, salinity, transparency, dissolved oxygen, pH, nitrogen, etc. Conductivity Temperature Depth (CTD 9-11Plus, Sea-Bird) and its MOUNTED SBE43 probe will be used to collect 0-300m vertical hydrological data of the above information at each station.

This project has conducted tagging and releasing programs for sharks, marine mammals, and turtles. These programs will be used to monitor migration, habits, and releasing mortality. This voyage will include one type of label, as shown in Table 2.

Result

A total of 23 species (280 individuals) were recorded in this survey. Preliminary result

shows that harvest (including escape and released species) consists of Snake mackerel (19.60%) and Longnose lancetfish (18.90%). For commercial tuna, Bigeye tuna is the majority caught in this WCPO survey. More details can be found in Table 3. Hook position information for several major catches is recorded in Table 4. A total of 215 individuals have been sampled on board, and biological tissues include vertebra, gonad, stomach, heart, muscles, and so on (Table 5). The total catch of tuna and tuna-like species in the survey was 1773.1 kg (Table 6). Biological characteristics of several species with high catches were recorded (Table 7). Figures 6–7 depicted the comparisons of weight-based CPUE and number-based CPUE for the three major tuna species during the 2021–2025 cruises of the research vessel Songhang, respectively. Figures 8–10 depicted the effects of environmental factors in the standardized weight-based CPUE models for bigeye tuna, yellowfin tuna, and albacore tuna, respectively. Figures 11–13 depicted the spatial distributions of standardized weight-based CPUE and number-based CPUE for these three tuna species, respectively.Currently, our project is still in the process to collect the data and materials, therefore we only provide a brief description of our survey and sampling here.

Table 1. Hooks were released in the WCPO survey

Date	Set	Hooks	Hooks per day
September	7	3075	439
October	19	7747	407
November	14	4295	306

Table 2 Tags were used in the WCPO survey

Name of tags	number
MiniPAT w/Attached, Dart, Domeier Medium, No Dacron	19

Table 3 Harvest composition in the WCPO survey

English name	Scientific name	Individuals(num)	Proportion (%)
Sickle pomfret	*Taractichthys steindachneri*	13	4.6
blue shark	*Prionace glauca*	44	15.7
Bigeye tuna	*Thunnus obesus*	25	8.9
Bigeye thresher	*Alopias superciliosus*	3	1.1
Longnose lancetfish	*Alepisaurus ferox*	53	18.9

Swordfish	*Xiphias gladius*	2	0.7
Dealfish	*Desmodema polystictum*	1	0.3
Snake mackerel	*Gempylus serpens*	55	19.6
Escolar	*Lepidocybium flavobrunneum*	2	0.7
Albacore	*Thunaus alalunga*	24	8.6
Driftfish	*Cubiceps gracilis*	2	0.7
Pelagic stingray	*Dasyatrs vrolacea*	8	2.9
Ocean sunfish	*Mola mola*	1	0.3
Blue marlin	*Makaira nigricans*	4	1.4
Mahi mahi	*Coryphaena hippurus*	2	0.7
Wahoo	*Acanthocybium solandr*	7	2.5
Roundi escolar	*Promethichthys prometheus*	1	0.3
Silky shark	*Carcharhinus falciformis*	3	1.1
Longfin mako	*Isurus paucus*	2	0.7
Oceanic whitetip shark	*Carcharhinus longimanus*	1	0.3
Black mackerel	*Scombrolabrax heterolepis*	1	0.3
Katsuwonus pelamis	*Skipjiack tuna*	4	1.4
Yellowfin tuna	*Thunnus albacares*	22	7.8
sum		280	100.00

Table 4 Hook position information for several major catches

Species	**Hook positon**															
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Sickle pomfret	0	0	0	0	3	1	2	4	0	1	1	0	0	1	0	0
blue shark	0	4	3	3	7	4	1	5	1	9	3	1	0	0	1	1
Bigeye tuna	0	1	1	1	1	2	3	4	0	6	2	0	2	0	1	0
Bigeye thresher	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0
Dealfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Longnose lancetfish	2	2	5	2	3	3	0	5	0	11	8	4	2	4	2	0
Roundi escolar	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

Yellowfin tuna	0	1	3	2	0	3	2	4	1	0	0	2	1	1	1	1
Katsuwonus pelamis	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	0
Swordfish	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Blue marlin	0	0	0	1	0	0	0	0	0	1	1	0	0	0	1	0
Silky shark	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Ocean sunfish	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Mahi mahi	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Black mackerel	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Wahoo	0	0	1	2	0	0	0	0	1	1	1	0	0	0	0	0
Snake mackerel	0	2	4	2	5	2	3	4	1	5	0	3	13	4	9	0
Escolar	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Driftfish	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
Albacore	2	0	0	4	1	0	5	0	1	5	2	2	2	1	0	0
Longfin mako	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
Oceanic whitetip shark	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Pelagic stingray	0	2	0	0	0	1	1	0	0	1	0	1	2	0	0	0

Table 5 Sampling tissues and their numbers for each species of catch

English name	**Sampling tissue**	**Individuals (num)**
Sickle pomfret	Muscle, liver, heart, stomach, intestine, gonad, blood	13
Blue shark	blood, eyeball, teeth, muscle, liver, gonad, heart, stomach, kidney, intestine, brain, and vertebrae	12
Bigeye tuna	eyeball, muscle, liver, gonad, heart, stomach, kidney, intestine, and blood2	23
Bigeye thresher shark	blood, eyeball, teeth, muscle, liver, gonad, heart, stomach, kidney, intestine, brain, and vertebrae	1
Longnose lancetfish	eyeball, muscle, head, liver, gonad, heart, stomach, intestine, and blood	49
Swordfish	eyeball, muscle, liver, gonad, heart, stomach, intestine, and blood	2

Polkadot ribbonfish	muscle, liver, gonad, heart, stomach, intestine, and blood	1
Snake mackerel	eyeball, muscle, head, liver, gonad, heart, stomach, intestine, and blood	50
Escolar	eyeball, muscle, head, liver, gonad, heart, stomach, intestine, and blood	1
Albacore	eyeball, muscle, liver, gonad, heart, stomach, kidney, intestine, and blood	19
Longfin cigarfish	eyeball, muscle, head, liver, gonad, heart, stomach, intestine, and blood	2
Pelagic stingray	muscle, head, liver, gonad, heart, stomach, intestine, and blood	7
Blue marlin	eyeball, muscle, liver, gonad, heart, stomach, intestine, and blood	3
Common dolphinfish	muscle, head, liver, gonad, heart, stomach, intestine, and blood	2
Wahoo	muscle, head, liver, gonad, heart, stomach, intestine, and blood	6
Roudi escolar	muscle, head, liver, gonad, heart, stomach, intestine, and blood	1
Silky shark	blood, eyeball, teeth, muscle, liver, gonad, heart, stomach, kidney, intestine, brain, and vertebrae	1
Longfin mako shark	blood, eyeball, teeth, muscle, liver, gonad, heart, stomach, kidney, intestine, brain, and vertebrae	1
Skipjack tuna	muscle, head, liver, gonad, heart, stomach, intestine, and blood	4
Yellowfin tuna	eyeball, muscle, liver, gonad, heart, stomach, kidney, intestine, and blood	17
Sum		215

Table 6 Tuna and tuna-like species were caught in the WCPO survey

Species	**Albacore tuna**	**Bigeye tuna**	**Yellowfin tuna**	**Swordfish**	**Blue marlin**
Weight(kg)	447.14	688.78	282.78	39.4	315.0
Individual(num)	24	25	22	2	4

Table 7 Biological characteristics of the main economic fish species and bycatch

species

Species	Average length or width(cm)	Standard deviation of length	Minimum length (cm)	Maximum length (cm)
Albacore tuna	108.43	39.60	95	124
Bigeye tuna	121.7	39.24	99.5	159.3
Yellowfin tuna	106.5	39.70	43	135
Swordfish	146.5	43.38	81	132
Blue marlin	236.33	51.09	186	303

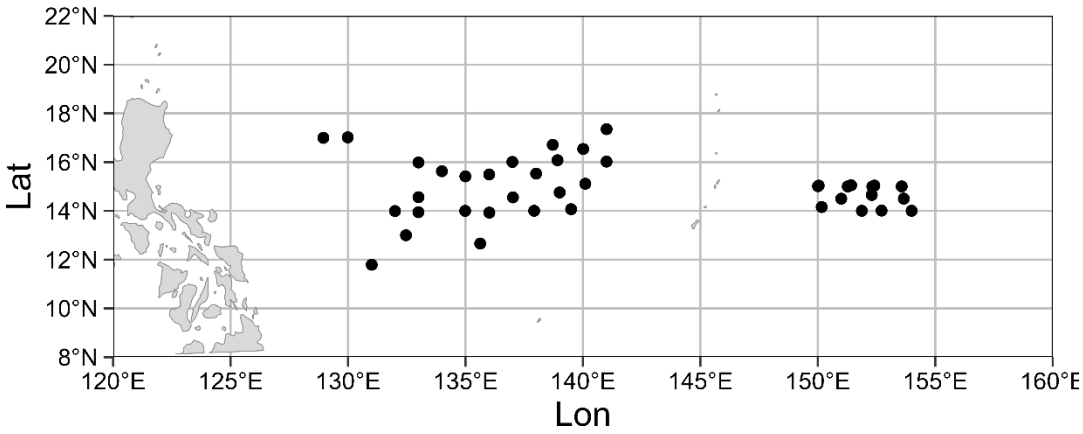

Figure 1 Spatial distribution for the scientific survey in WCPO.

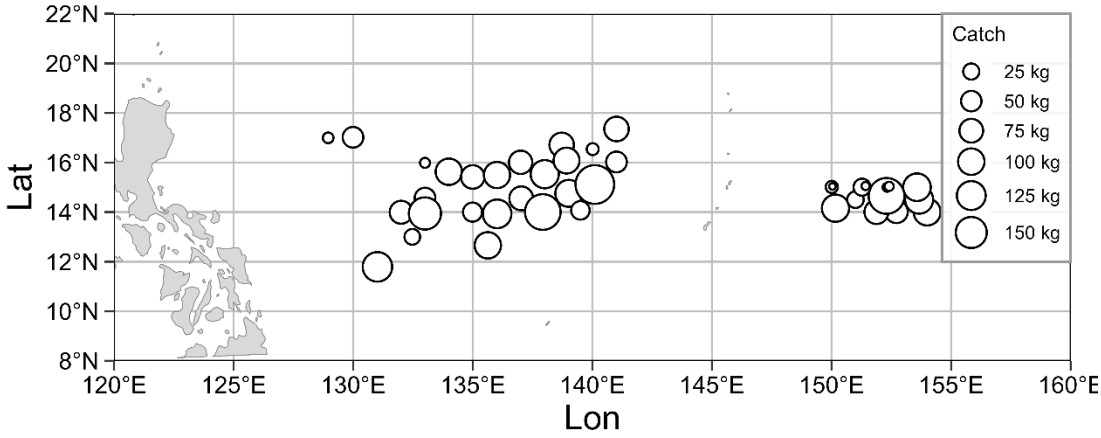

Figure 2 Spatial distribution of total catch in the survey area

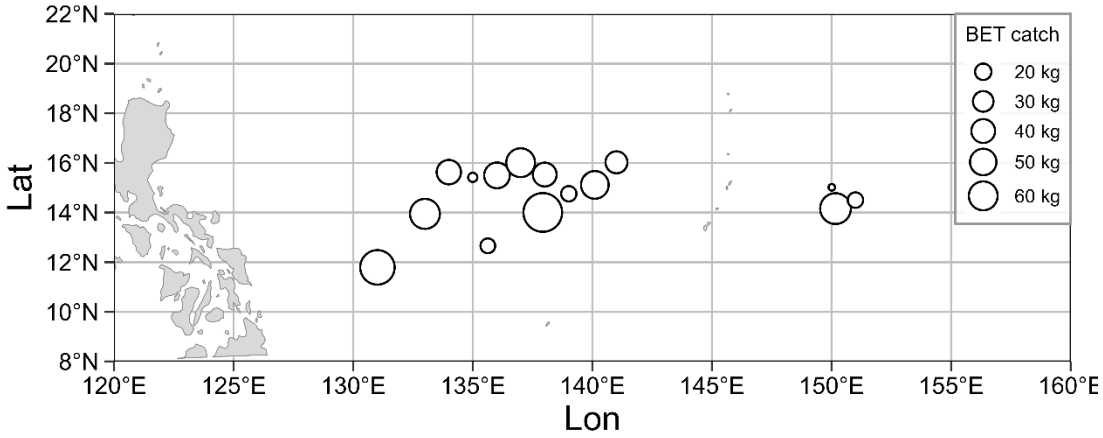

Figure 3 Spatial distribution of bigeye tuna catch

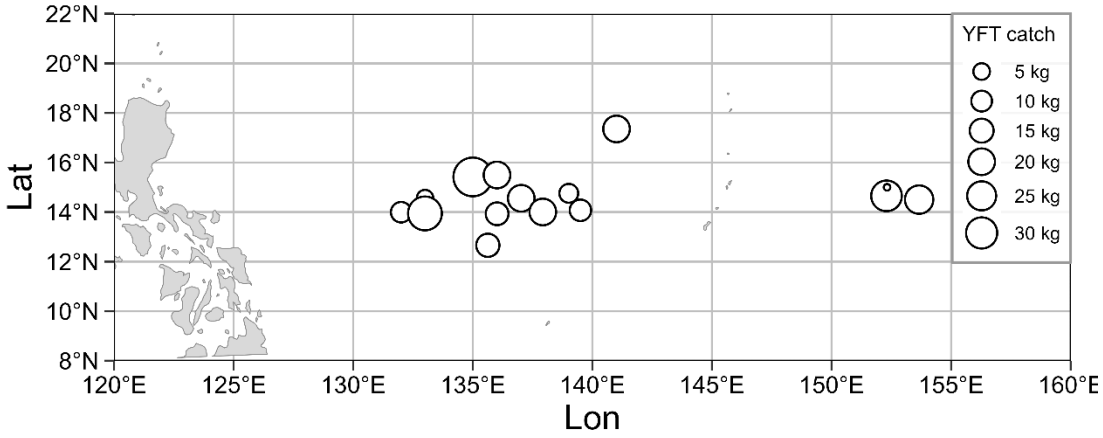

Figure 4 Spatial distribution of yellowfin tuna catch

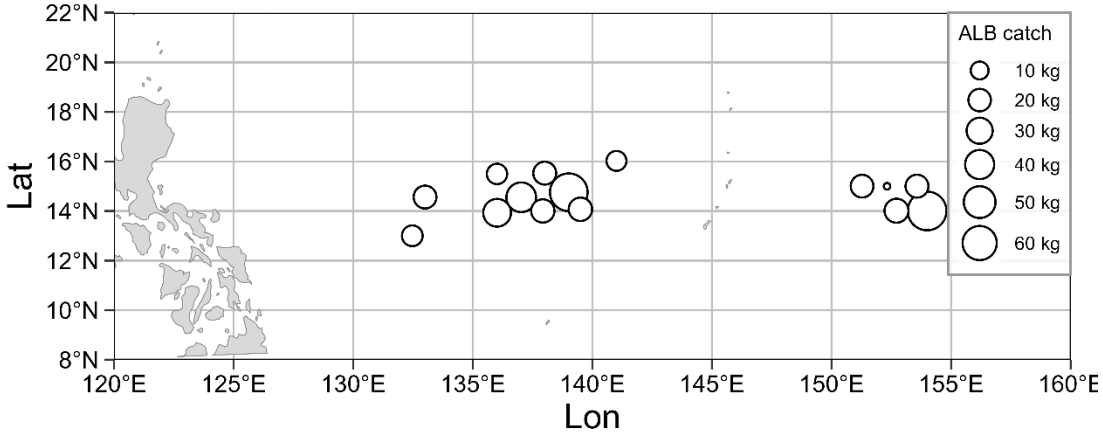

Figure 5 Spatial distribution of albacore tuna catch

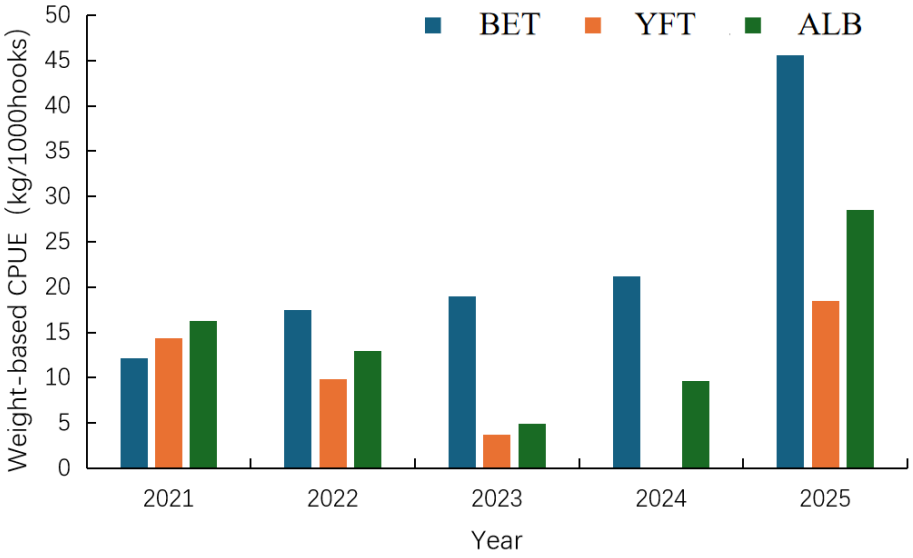

Figure 6. Comparison of weight-based CPUE for the three major tuna species during the 2021–2025 cruises of the research vessel Songhang

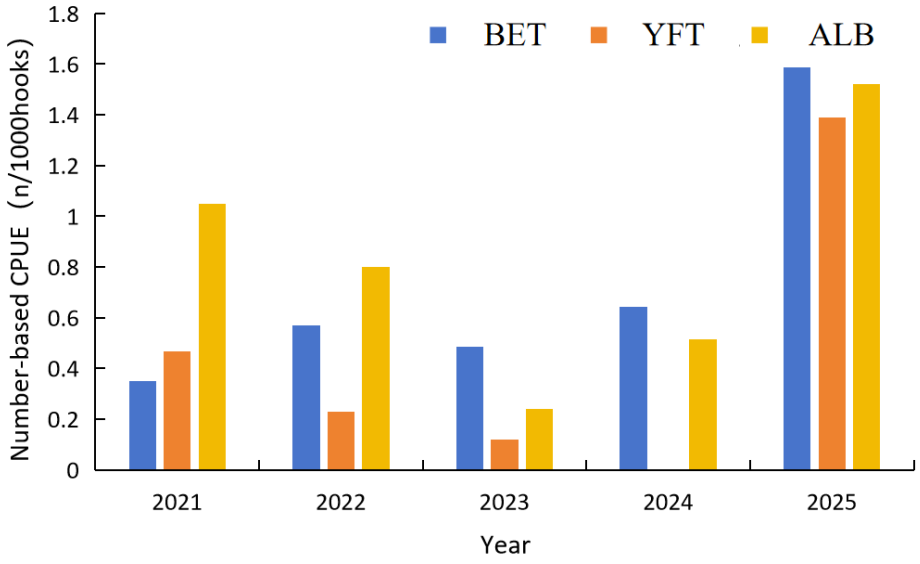

Figure 7. Comparison of number-based CPUE for the three major tuna species during the 2021–2025 cruises of the research vessel Songhang

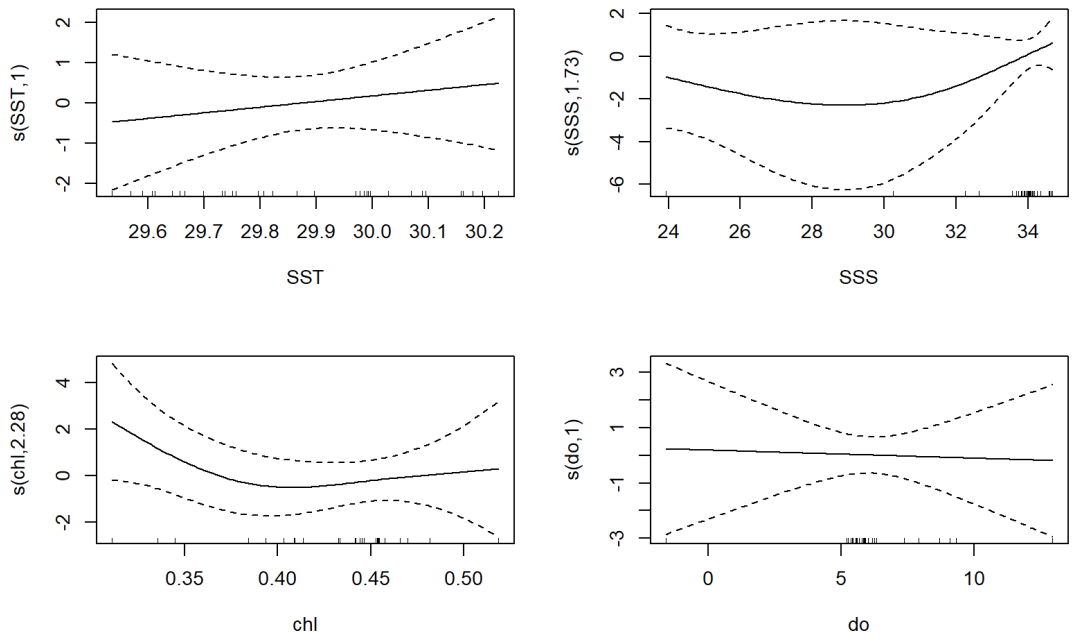

Figure 8. Effects of environmental factors in the standardized weight-based CPUE model for bigeye tuna

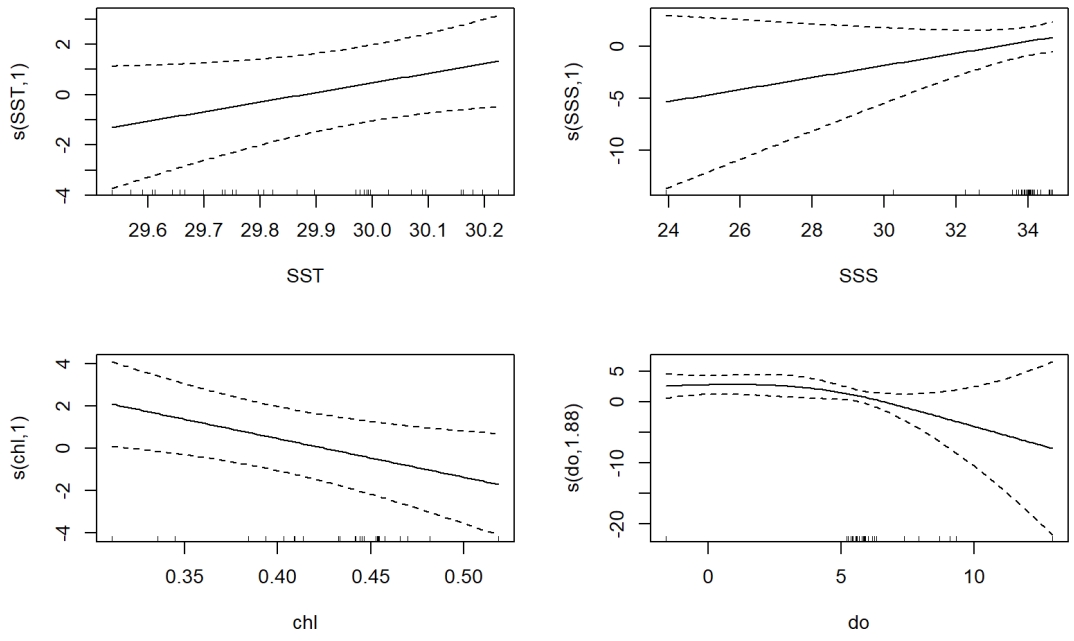

Figure 9. Effects of environmental factors in the standardized weight-based CPUE model for yellowfin tuna

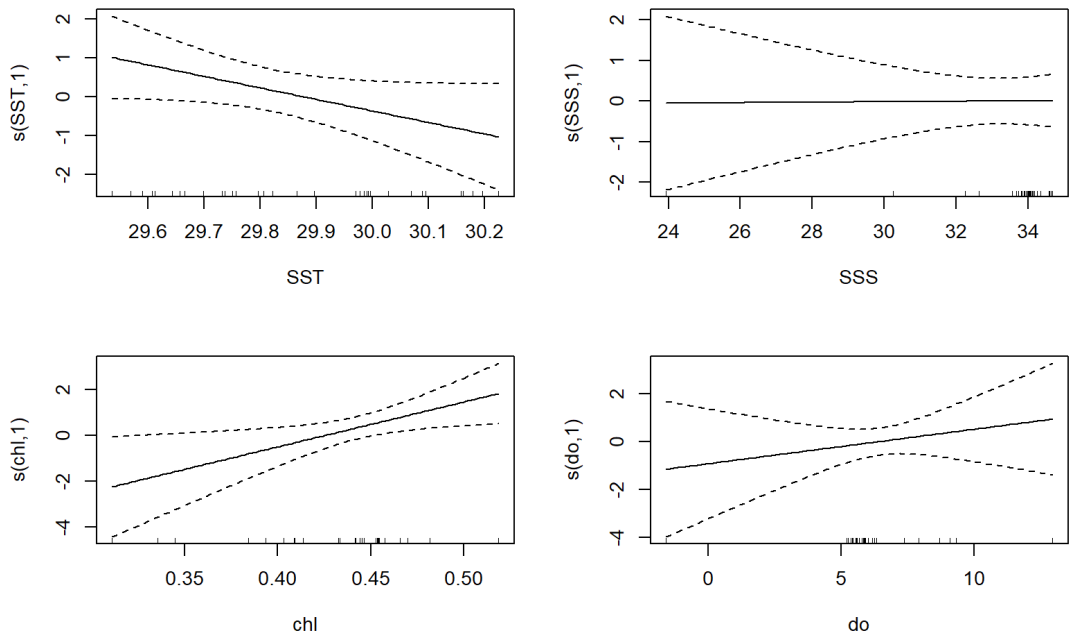

Figure 10. Effects of environmental factors in the standardized weight-based CPUE model for albacore tuna

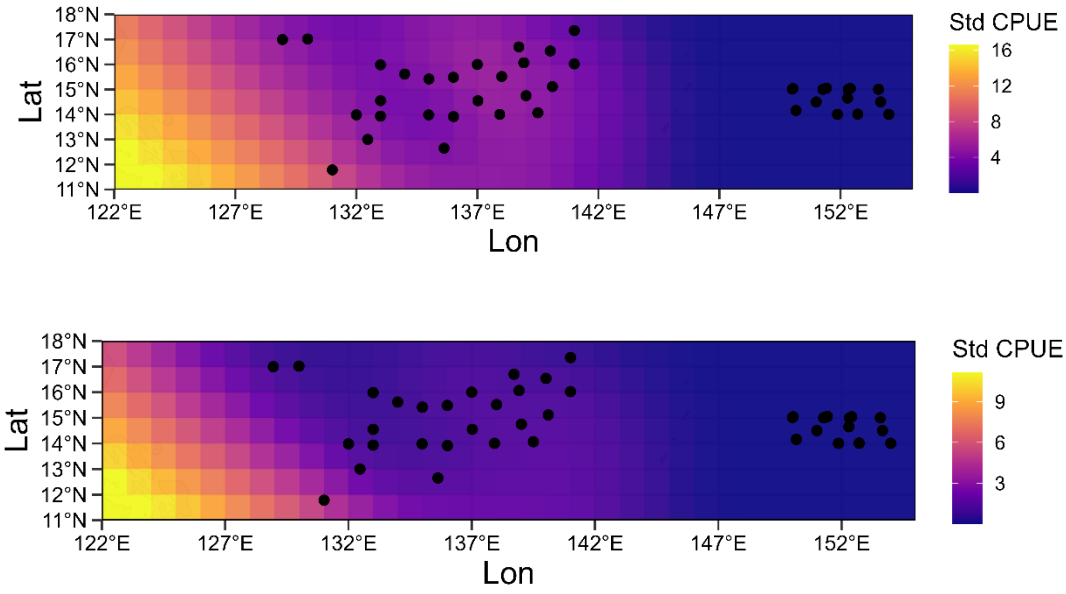

Figure 11. Spatial distribution of standardized weight-based CPUE and number-based CPUE for bigeye tuna

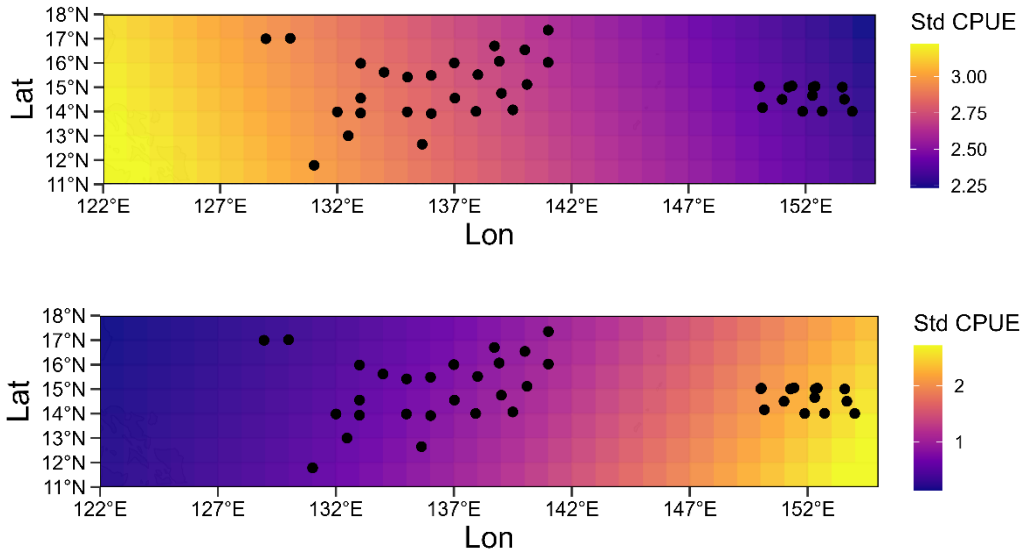

Figure 12. Spatial distribution of standardized weight-based CPUE and number-based CPUE for yellowfin tuna

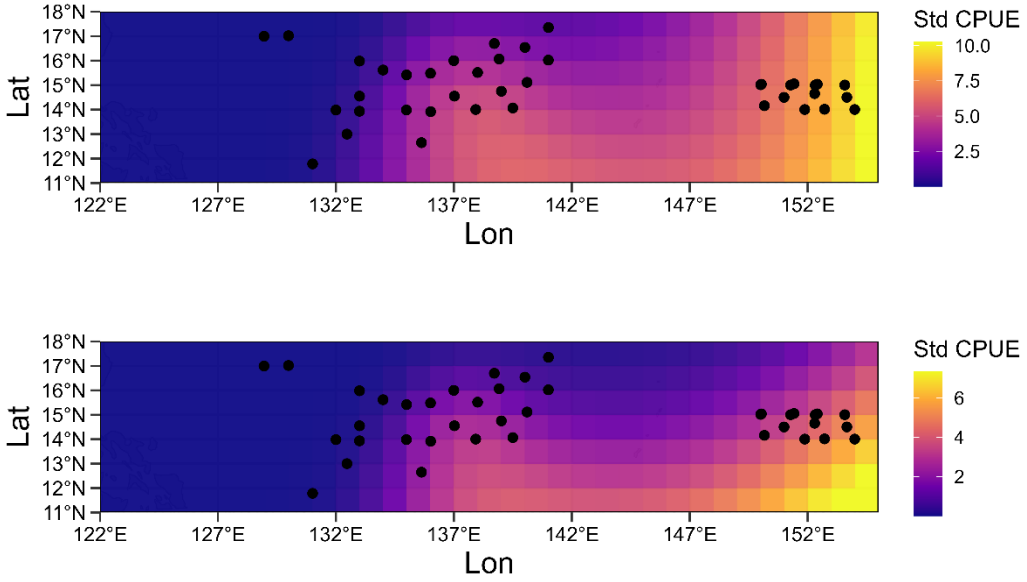

Figure 13. Spatial distribution of standardized weight-based CPUE and number-based CPUE for albacore tuna