Acta Ichthyologica et Piscatoria 54, 2024, 75–86 | DOI 10.3897/aiep.54.112388

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ACTA ICHTHYOLOGICA ET PISCATORIA

Dynamics of fish community structure in the Yeosu Coast, Korea: A comprehensive analysis of daily set-net catch data during 2008–2022

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Academic editor: Sanja Matić-Skoko ♦ **Received** 7 September 2023 ♦ **Accepted** 18 December 2023 ♦ **Published** 15 March 2024

Citation: Moon SY, Lee MH, Jung K-M, Koo MS (2024) Dynamics of fish community structure in the Yeosu Coast, Korea: A comprehensive analysis of daily set-net catch data during 2008–2022. Acta Ichthyologica et Piscatoria 54: 75–86. https://doi.org/10.3897/aiep.54.112388

Abstract

This study focuses on the Yeosu Coast, a critical ecological and economic zone on the Korean Peninsula. We conducted a comprehensive analysis of fish data obtained from daily set nets for the period of 2008–2022 (excluding 2017) to investigate variations in fish composition and community structure over a 15-year period. The catches were characterized by a prevalence of warm-water fish species, reflecting the temperate and subtropical character of the Yeosu Coast. The total catch during the study period was 3210.8 tonnes, with 2010 and 2016 registering the highest and lowest catches, respectively. Our analysis identified sea surface temperature as a primary factor correlated with these changes in species composition. The two dominant species, *Scomberomorus niphonius* (Cuvier, 1832) and *Engraulis japonicus* Temminck et Schlegel, 1846 together accounted for a remarkable 78.9% of the total catch. Notably, the Shannon–Weaver diversity index values were lower in 2015 than in 2008, indicating potential shifts in the community structure. Our analysis identified sea surface temperature as the most dominant factor that influenced these changes in species composition. Furthermore, we highlight the significant threats posed by climate change and the increasing number of jellyfish challenging fisheries on the Yeosu Coast. These threats have the potential to result in diminished set-net catches and declining biodiversity within this valuable ecosystem. Our findings underscore the importance of monitoring and addressing these ecological shifts to ensure the long-term sustainability of Yeosu Coast fisheries.

Keywords

climate change, biodiversity, fish composition, sea surface temperature, Shannon–Weaver diversity index

Introduction

The Yeosu Coast, located in the central-southern region of Korea, is a ria-type coast. It has a dynamically diverse marine environment owing to factors such as the Tsushima Warm Current (TWC), the Jeju Warm Current flowing from the West of Jeju Island, and the formation of southern coastal waters during winter, which spread beneath the weak water temperature layer in summer (Lie and Cho 1997; Choo 2002; Chang et al. 2004). These seasonal variations create habitats for both pelagic and coastal settling fish species, creating an essential fishing ground with abundant fish resources (Kim et al. 2003; Hwang et al. 2006; Kim et al. 2013). Notably, different water masses converge at the Yeosu Coast and form a frontal zone that fosters nutrient supply through upwelling, resulting in increased primary production of phytoplankton and zooplankton abundance (Kang and Jeon 1999; Moon et al. 2010, 2022a). This dynamic

ecosystem serves as a spawning ground and nursery for small pelagic fish (Yoo et al. 2017; Moon et al. 2022b).

Hence, the Yeosu Coast boasts rich fish resources and supports fishing activities that employ various fishing gear. Among these, the most popular gear is the set net, which is a passive fishing method that intercepts fish schools using nets to guide them into a specific area for capture. While the pelagic and seasonally migratory fish species residing in offshore waters are the primary targets of set nets, catches are typically influenced by fluctuations in sea conditions, such as water temperature, in the deployment area. This attribute enables localized set nets to closely monitor the recruitment and catch trends of pelagic and migratory fish species (Kim et al. 2003; Hwang et al. 2006; Kim et al. 2013). Despite the installation of various set nets along the Yeosu Coast, the larger-scale set nets may be more effective in capturing a comprehensive array of fish species, including pelagic and demersal types (Kim et al. 2003; Hwang et al. 2006). Because of the significant fluctuations experienced by the monthly or seasonal set-net survey data, identifying potential survey periods and increasing sample sizes are necessary to closely analyze the species composition and catch characteristics of demersal fish species in the surveyed area.

Previous studies on set-net fisheries conducted along the Yeosu Coast have been primarily focused on the species composition and quantitative variations in set-net-caught fish (Jeong et al. 2005; Hwang et al. 2008), species composition and quantitative variations in long-line-caught fish (Han and Oh 2007; Kim et al. 2017), species richness and quantitative variations in set-net-caught fish (Kim et al. 2003), species richness and quantitative variations in bycatch from set nets (Jeong et al. 2015), and bycatch in general (Yoo et al. 2016). However, these investigations were based on species composition and quantitative variations in fish captured over short timeframes. Remarkably, no study has examined the species composition of set-net catches off the Yeosu Coast using daily catch data for over two decades (Hwang et al. 2006).

Furthermore, the influence of climate change on the composition of marine ecosystems has been documented (Hoegh-Guldberg and Bruno 2010; Doney et al. 2012; Zhang et al. 2020). In recent years, the southern coast of the Korean Peninsula, including the Yeosu area, has witnessed a persistent increase in surface water temperature due to climate change (Han and Lee 2020). This highlights the need for long-term comparative data regarding species richness and fluctuation patterns. Such information is vital for the effective management and preservation of fishery resources in such a region. In this study, daily catch data from set nets along the Yeosu Coast spanning the past 15 years (2008–2022) were collected. The objective of this study was to determine the composition, catch quantities, and attributes of key commercial fish species. These data were then correlated with changes in water temperature. A comparison was also conducted linking these findings to those of studies conducted two decades ago. The overarching goal of this study is to provide foundational data to support the efficient conservation and sustainability of fishery resources off the Yeosu Coast in the context of a rapidly changing climate.

Materials and methods

Data collection. The set-net fishing sites and real-time coastal information system for sea surface temperature (SST) by the Korea Oceanographic Data Center (KODC) in this study were located between Dolsan and Geumo Islands, Yeosu, Jeollanam-do (Fig. 1). The maps were created using the ODV software (Schlitzer 2021). Daily catch data obtained during the set-net fishing season from 2008 to 2022 were scrutinized, excluding 2017 because of missing data. This analysis aimed to assess the catch ratio and variations in major fish species on a monthly and yearly basis. The set net used (750–800 m in length, 30 m in width, with mesh sizes of 120 mm in the leader net and 75 mm in the playground)was a modified hawkbill net set to the mean depth of 25 m near Dolsan Island, Yeosu. It captured small pelagic fish that migrated near the shore from spring to early summer (March–June). Set nets with a mesh size of 0.42 cm were used during spring and early summer, whereas a larger mesh size of 27.55 cm was employed during the late summer and winter fishing seasons (July–December). As the daily catch data were recorded in terms of box counts, the monthly catch for each species was computed by converting the mean box weight into 15 kg during the fishing period. Species that were challenging to identify in the daily catch data, such as sharks and cetaceans, and those with sporadic appearances and significantly higher weights, were excluded from the analysis. The analysis focused on the major commercial fish species. To understand the correlation between the catch of major fish species in set nets and shifts in SST over the past 15 years, daily water temperature data obtained from the KODC (KODC 2023, Fig. 1) of the National Institute of Fisheries Science were used. These real-time marine environment fishery information observations were collected from 2008 to 2022 and transformed into monthly mean data for Hwatae Island (34°35′10″N, 127°43′02″E) in Yeosu, a location proximate to the set-net fishing grounds. Jellyfish data were obtained from the Korean jellyfish monitoring program (KoJeM), operated by the National Institute of Fisheries Sciences (NIFS), South Korea. The KoJeM program was launched in 2006 as a weekly survey to track changes in the ratio of jellyfish occurrences in the coastal waters of South Korea. In this study, we assessed jellyfish data over the period from 2008 to 2022, as these years correspond to the period with the best sampling resolution (NIFS 2023).

Data analysis. To evaluate the species diversity of the captured fishery resources, the species diversity index (H') was calculated using the Shannon–Weaver diversity index (Shannon and Weaver 1963) expressed as follows:

$$H' = \sum_{i=1}^{S} P_i \times \mathrm{Log} P_i$$

where S is the total catch of species and P_i is the relative cover of i_{th} species.

Changes in the fish community across ecological successions along the Yeosu Coast were analyzed over a

15-year study period using non-metric multidimensional scaling (nMDS). The nMDS ordinations were generated from Bray–Curtis similarity matrices calculated using log-transformed catch data for all species (Clarke and Gorley 2014). Species within each nMDS group were compared using similarity analysis (ANOSIM) to identify statistically significant differences among the groups. ANOSIM ranks the similarity between samples within the similarity matrix and tests the null hypothesis that the average rank of the within-group similarity is not significantly different from the average rank of the between-group similarity. Groups found to be significantly different by ANOSIM were further analyzed using the similarity percentage routine (SIMPER) to identify the species or taxa that most contribute to the distinctiveness of each group. SIMPER calculates the average similarity within each group and determines the percentage contribution of each species/taxon to the overall group similarity. These analyses were performed using the PRIMER version 6.0 statistical package (Clarke and Gorley 2014). In addition to the analyses of nMDS and SIMPER, we conducted univariate linear regression analyses to examine the relations between biotic variables (dependent variables) and potential explanatory variables (independent variables). The biotic variables were the abundances of eight fish species: *Scomberomorus niphonius* (Cuvier, 1832), *Engraulis japonicus* Temminck et Schlegel, 1846, *Pampus argenteus* (Euphrasen, 1788), *Trichiurus japonicus* Temminck et Schlegel, 1844, *Lophius litulon* (Jordan, 1902), *Seriola quinqueradiata* Temminck et Schlegel, 1845, *Scomber japonicus* Houttuyn, 1782, and *Trachurus japonicus* (Temminck et Schlegel, 1844). We used two environmental variables as potential explanatory factors: annual mean SST and the ratio of jellyfish occurrences. Both of these variables were available for the entire 15-year study period.

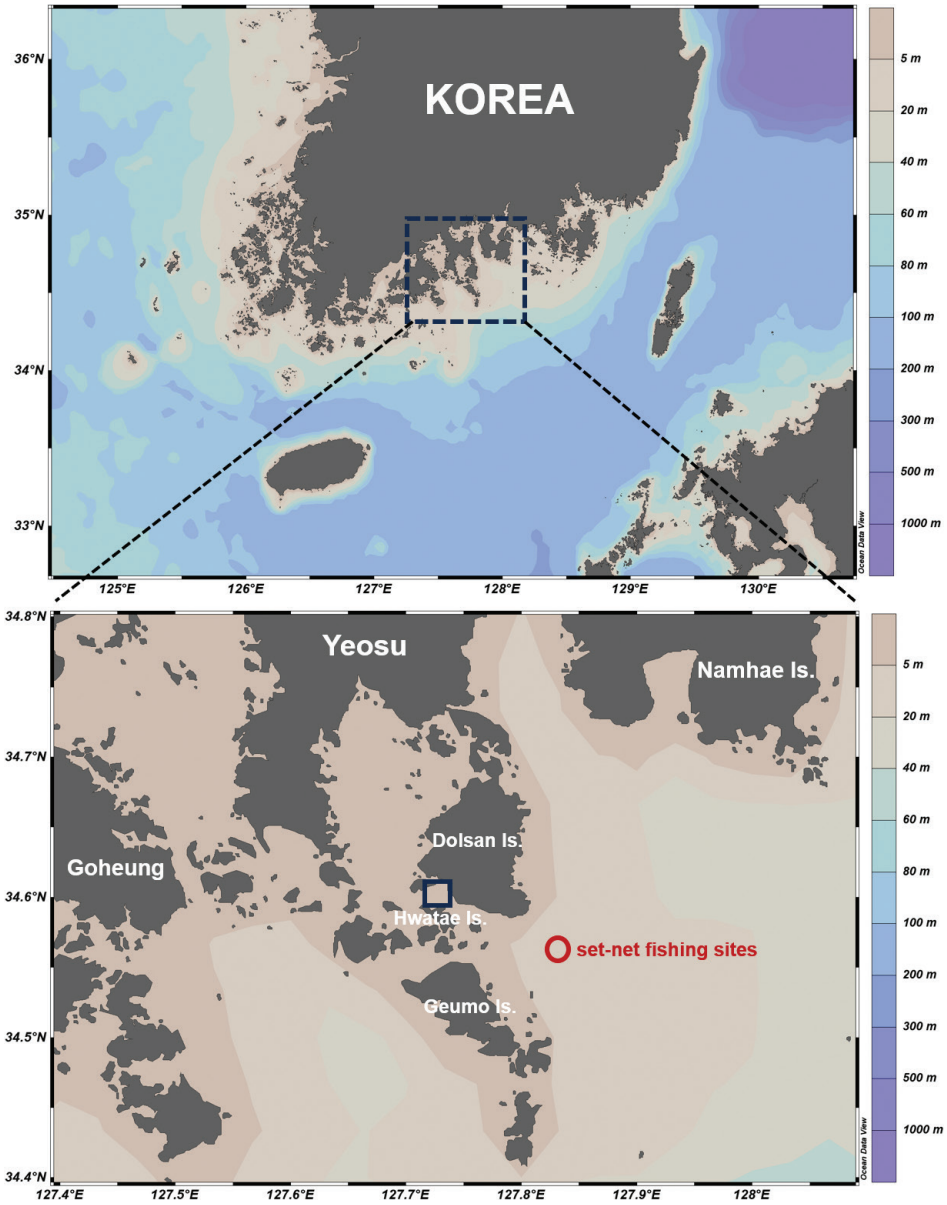

Figure 1. Map showing the set-net fishing sites (red circle) and real-time coastal information system for sea surface temperature by the KODC (Korea Oceanographic Data Center) (black square) at the Yeosu Coast, Korea.

Results

Sea surface temperature. Throughout the survey period, the mean monthly SST near Hwatae Island, near the Yeosu set nets, exhibited typical characteristics of temperate waters with well-defined seasonal shifts ranging from 6.78 to 26.76°C. The lowest SST was recorded in February 2018, whereas the highest was recorded in August 2018. Notably, elevated mean SST of 26.76 and 26.47°C were noted in the summers of 2018 and 2021, respectively, which were primarily attributed to the heightened coastal SST during the summer (Fig. 2A).

Species composition, diversity index, and catch characteristics. The set-net catch during the study period included 15 orders, 49 families, and 84 taxa of fish species. The highest number of species was observed in 2011, whereas the lowest was observed in 2021 (Fig. 2B). The species diversity index (H') of the Yeosu set nets ranged from 0.93 to 1.85 across the years (Fig. 2C), with the lowest and highest values registered in 2015 and 2016, respectively. From 2008 to 2022, the cumulative catch from the Yeosu coastal set nets reached 3210.8 tonnes. The peak catch was recorded at 470.6 tonnes in 2010, whereas the lowest was 75.5 tonnes in 2016 (Fig. 2D). *Scomberomorus niphonius* and *Engraulis japonicus* constituted a substantial proportion, accounting for 78.9% of the total catch. The fishing season for Yeosu's coastal set nets spans from April to December, peaking during the fall months of October and November. The yearly catch rate analysis showed that the catch rate of *Scomberomorus niphonius* exceeded 60% every year, except in 2013 and 2016, which witnessed rates of 55.3% and 32.4%, respectively (Fig. 2E). Conversely, the *Engraulis japonicus* catch rate fluctuated annually, with the highest rate of 34.2% recorded in 2016. *Pampus argenteus* (Euphrasen, 1788) exhibited a declining trend, after increasing from a catch rate of 5.6% in 2008 to 10.9% in 2011, whereas *Trichiurus japonicus* demonstrated average fluctuations. Five additional species, namely *Pampus argenteus*, *Lophius litulon*, *Sarda orientalis* (Temminck et Schlegel, 1844), *Seriola quinqueradiata*, and *Trachurus japonicus* had catch rates exceeding 3%.

Community structure and occurrence of major fish species. Using the fish catch data, cluster analysis was conducted using the Bray–Curtis similarity [%] and the nMDS array method based on a 70% similarity threshold. This analysis yielded Cluster A, comprising four clusters for the period 2008–2011, Cluster B for 2012–2015, and Cluster C for 2016–2022 (Fig. 3). The ANOSIM test, applied to assess the significance of ecological segregation among fish communities near the Yeosu Coast of Korea, confirmed significant differences in the assemblage structure between the three groups identified via set-net sampling (ANOSIM, $P < 0.05$, global $R = 0.773$). SIMPER analysis further explored these differences in mean species abundance across the groups (Table 1). The values in Table 1 represent the average similarities between the communities, as characterized by SIMPER. A large portion of the similarity within each set-net fish community stemmed from species contributing over 3% of the total abundance and commonly found within the pre-defined year groups. Cluster A was dominated by *Scomberomorus niphonius*, *Engraulis japonicus*, *Pampus argenteus*, *Trichiurus japonicus*, *Lophius litulon*, *Cololabis saira* (Brevoort, 1856), *Trachurus japonicus*, and *Seriola quinqueradiata*. Cluster B shared several dominant species with Cluster A, including *Scomberomorus niphonius*, *Engraulis japonicus*, *Pampus argenteus*, *Trichiurus japonicus*, and *Lophius litulon*, but also featured *Nibea albiflora* (Richardson, 1846) prominently. Cluster C, while still containing *Scomberomorus niphonius*, differed more distinctly from the others, with *Pampus argenteus*, *Trichiurus japonicus*, and *Lophius litulon* emerging as key contributors alongside *Pampus punctatissimus* (Temminck et Schlegel, 1845).

Relations between major fish species and environmental factors. The analysis of annual patterns of catch fluctuations among the dominant species in the Yeosu set nets (Fig. 4) revealed consistent annual patterns of increases and decreases. *Scomberomorus niphonius*, primarily caught during the fall, has declined since 2010 and resurged since 2020. *Engraulis japonicus*, which is mainly caught during the spring, has shown a declining catch trend since 2012. The number of *Pampus argenteus* captured from spring to fall has declined since 2013. *Trichiurus japonicus*, typically caught during the summer and fall, has demonstrated an upward trend since 2014; however, *Trichiurus japonicus* catches have remained minimal, except in 2010. *Lophius litulon*, which is often caught during the winter and spring, exhibited a trend of annual increases and decreases in catch. An analysis of the relation between monthly mean SST and the

Table 1. Similarity percentage analysis (SIMPER) list of fish species captured in daily set nets in the Yeosu Coast, Korea during 2008–2022 contributing mostly to similarities within specified periods.

Cluster	Main species	Contribution [%]
Cluster A (2008–2011)	*Scomberomorus niphonius*	5.91
Average similarity: 82.13	*Engraulis japonicus*	4.57
	Pampus argenteus	4.51
	Trichiurus japonicus	4.25
	Lophius litulon	4.15
	Cololabis saira	3.80
Cluster B (2012–2015)	*Scomberomorus niphonius*	6.21
Average similarity: 83.28	*Engraulis japonicus*	5.42
	Pampus argenteus	4.80
	Trichiurus japonicus	4.59
	Lophius litulon	4.28
	Nibea albiflora	3.89
Cluster C (2016–2022)	*Scomberomorus niphonius*	6.60
Average similarity: 76.65	*Pampus argenteus*	5.42
	Trichiurus japonicus	5.15
	Engraulis japonicus	4.94
	Lophius litulon	4.77
	Pampus punctatissimus	4.57

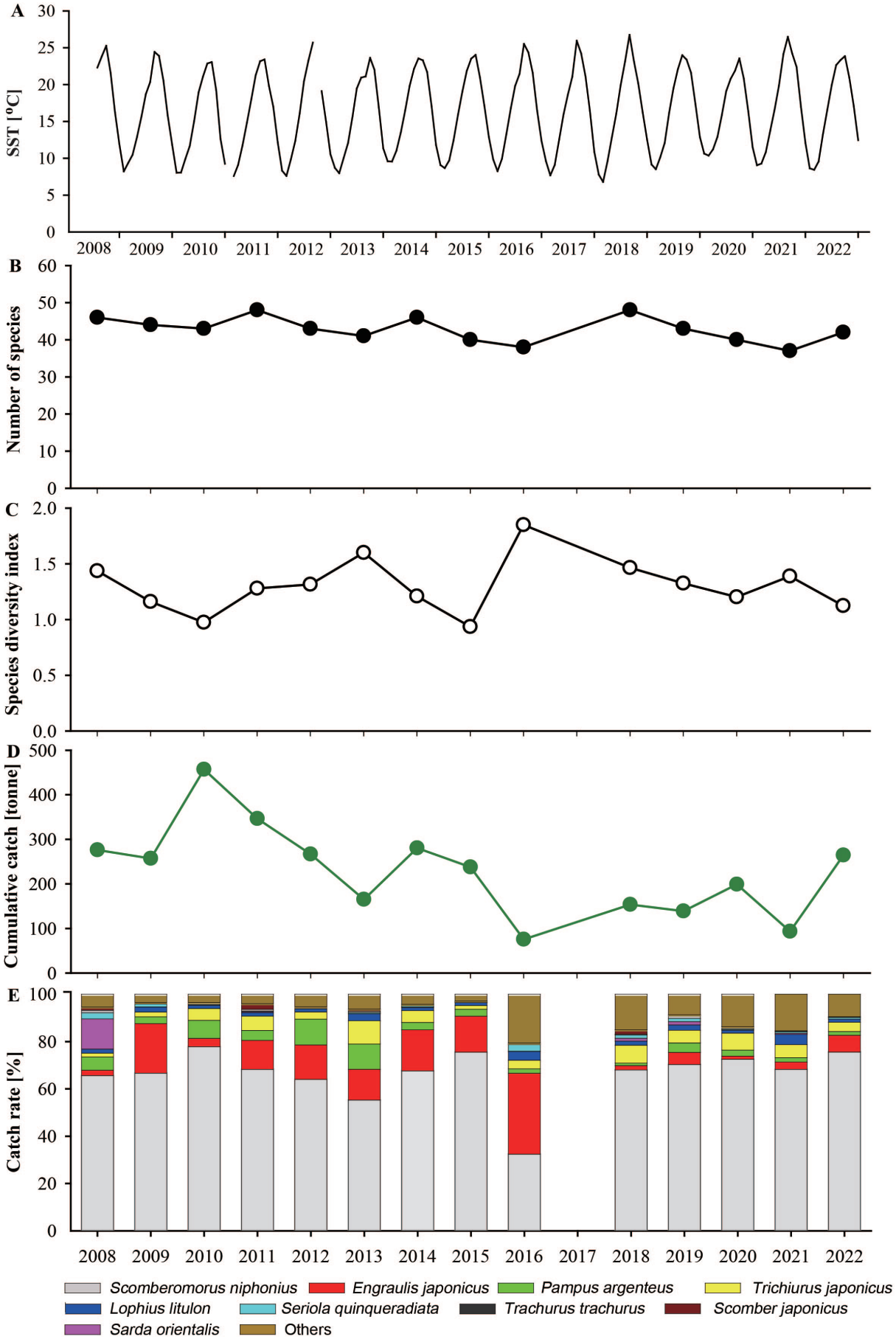

Figure 2. Monthly average variations in sea surface temperature (SST) (**A**), number of fish species (**B**), fish species diversity index (*H'*) (**C**), cumulative catch (**D**), and catch rate (**E**) of daily set-net catch in the Yeosu Coast, Korea during 2008–2022.

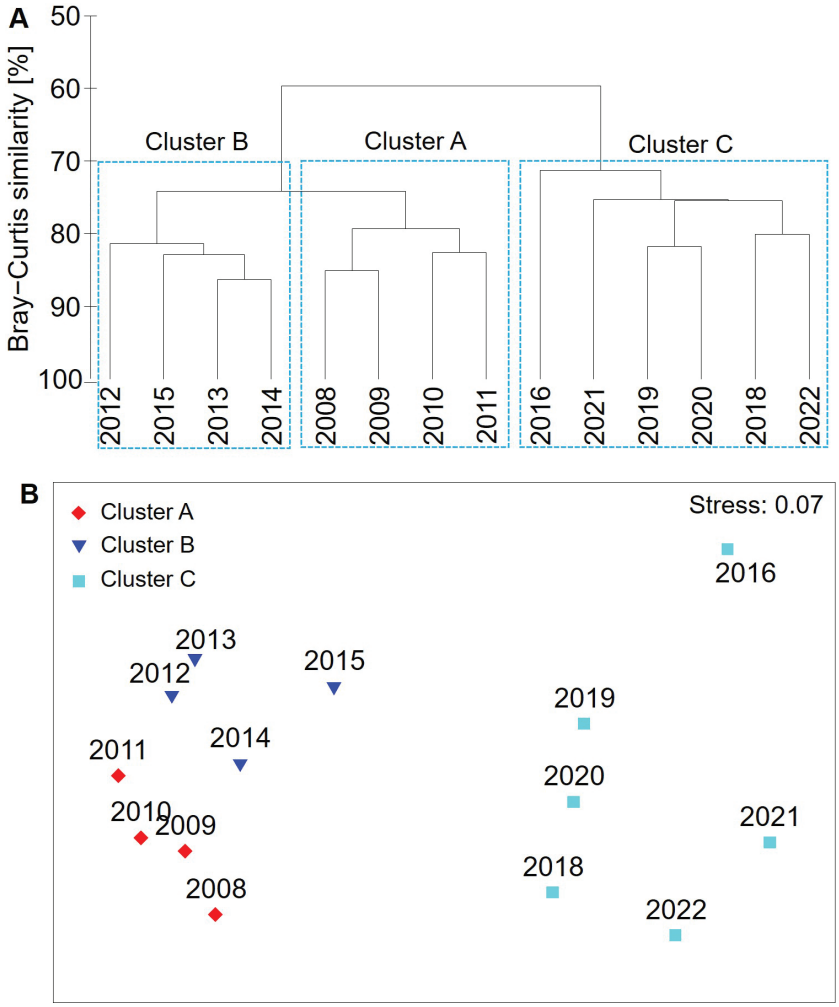

Figure 3. Cluster analysis (**A**) and non-metric multi-dimensional scaling (nMDS) analysis (**B**) of the fish assemblages of daily set-net catch in the Yeosu Coast, Korea during 2008–2022.

log-transformed catches of the top eight species during the survey period revealed that catches of *Scomberomorus niphonius* and *Trichiurus japonicus* significantly increased with increasing SST ($P < 0.05$; Fig. 5). Conversely, catches of *Lophius litulon* declined with increasing SST. However, no significant correlation was found between SST and *Pampus argenteus*, *Seriola quinqueradiata*, *Scomber japonicus*, and *Trachurus japonicus*. Notably, while *Lophius litulon* showed a negative association with warming temperatures *Seriola quinqueradiata*, *Scomber japonicus*, and *Trachurus japonicus* displayed no significant relation with SST. The relation between the monthly catch of set nets in the Yeosu Coast and the frequency of jellyfish outbreaks during the study period was analyzed. The catch of commercial species was affected by the frequency of jellyfish outbreaks. Specifically, *Scomberomorus niphonius* and *Trachurus japonicus* exhibited a pattern where log-transformed catch quantities decreased as the occurrence ratio of jellyfish increased (Fig. 6). SST and the occurrence ratio of jellyfish showed a positive correlation (Fig. 7). The analysis of the annual catch of two subtropical fish species in the set nets in the Yeosu Coast (Fig. 8) revealed an increase in the catch frequency of *Sphyraena pinguis* Günther, 1874 since 2011. Similarly, the catch of *Auxis rochei* (Risso, 1810) was approximately 2.1 tonnes in 2018, but it reached a peak of 6.8 tonnes in 2020.

Discussion

Analysis of species composition and community characteristics. We analyzed fish species composition and community characteristics using daily logbook data collected from March to December, which corresponds to the fishing season of the set nets located off the coast of Yeosu. Data from 2017 were excluded because of unavailability. Over the study period, water temperatures ranged from 6.78 to 26.76°C, with notable peaks in average annual water temperatures observed in 2018 and 2021, particularly during the summer months when they exceeded 25°C. The highest fish species richness was recorded in 2011, totaling 48 taxa, whereas the lowest was recorded in 2021. During this period, changes in the community composition of fish species were observed. Among these changes, the species that contributed to fish communities shifted. For example, *Seriola* spp. was the second most dominant fish taxon two decades ago; however, this position shifted

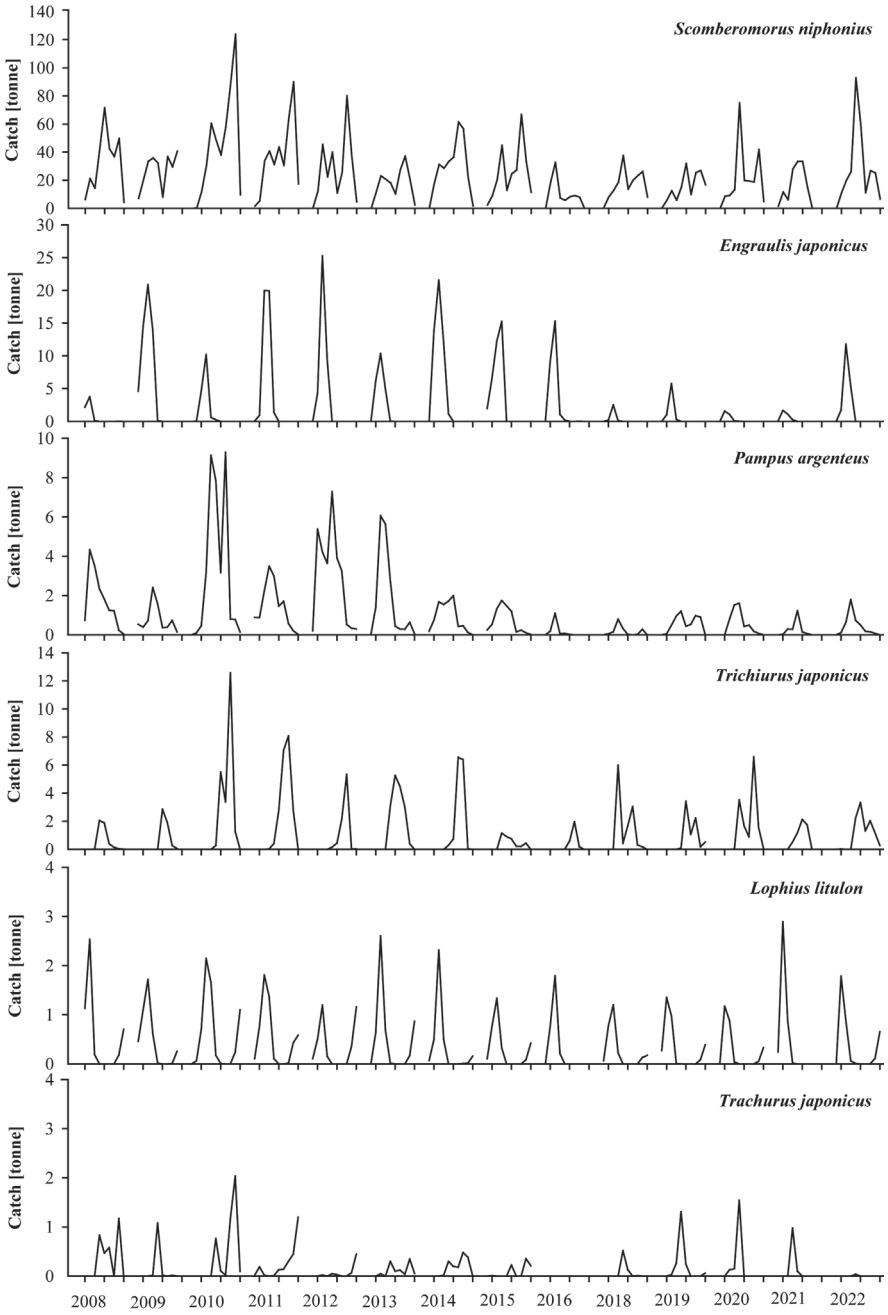

Figure 4. Annual patterns of catch fluctuations among the dominant fish species in daily set-net catch in the Yeosu Coast, Korea during 2008–2022.

to *Engraulis japonicus* after 2013. Based on daily catch data and considering the comparison of the sampling area, period, gear, and dominant species (Table 2), Hwang et al. (2006) stated that *Scomberomorus niphonius*, *Engraulis japonicus*, *Lophius litulon*, and *Trichiurus japonicus* accounted for 51.9% of the total catch two decades ago. In contrast, the presently reported study highlights the most abundant species, in descending order as follows: *Scomberomorus niphonius*, *Engraulis japonicus*, *Pampus argenteus*, *Trichiurus japonicus*, *Pampus punctatissimus*, and *Lophius litulon*. While the sequence of abundance is similar to the findings reported by Kim et al. (2013), notable distinctions include *Pampus argenteus* being the dominant species over *Sarda orientalis*. Notably, the prevalence of *Scomberomorus niphonius* surged to 68.8% while that of *Trichiurus japonicus* decreased to 4.6%. These shifts were particularly pronounced on the southern coast of Korea (KOSIS 2023). This suggests the influence of factors impacting the catch of *Engraulis japonicus*, such as habitat alterations due to long-term climate change (Bang et al. 2022) and closed fisheries seasons.

Community structure and subtropical fish species. Our study confirmed the statistical significance of the annual community structure of the Yeosu coastal set-net catch through cluster analysis. Among the fish species, fluctuations in the catch of *Scomberomorus niphonius*, *Engraulis japonicus*, *Pampus argenteus*, *Trichiurus japonicus*, and *Lophius litulon*, notably contributed to each cluster. Additionally, 11 subtropical fish species were identified.

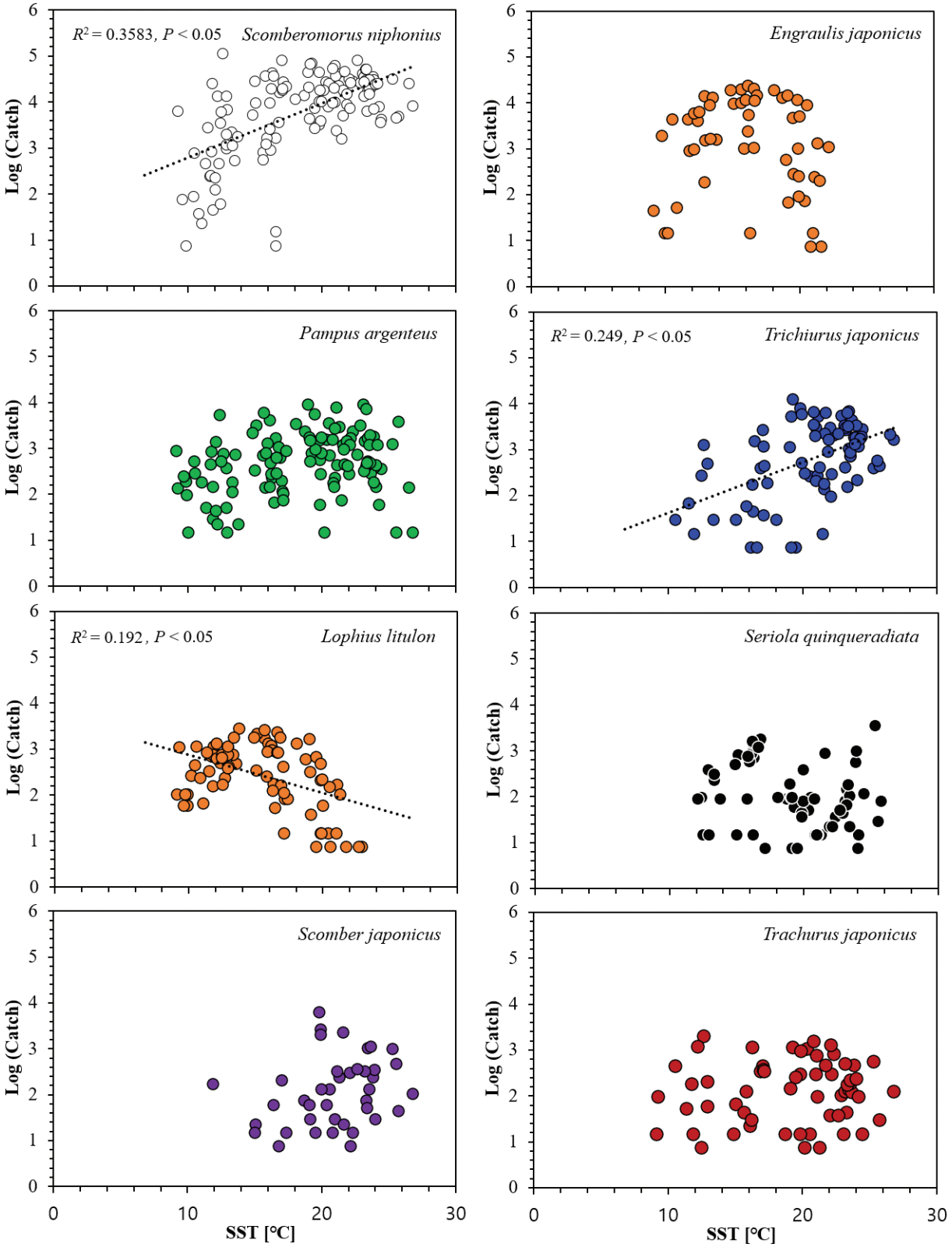

Figure 5. Correlations between monthly mean sea surface temperature (SST) and log-transformed catches of the top eight fish species from daily set nets in the Yeosu Coast, Korea during 2008–2022.

The catch frequencies of temperate and subtropical fish species showed an upward trend, with *Sphyraena pinguis* increasing since 2010, followed by *Auxis rochei* since 2018. Previous studies on the composition and occurrence of subtropical fish species in Korea were primarily conducted in Jeju Island, a region sensitive to subtropical climates. The increasing numbers of subtropical fish species observed over the years (Ko et al. 2015, 2021) are attributed to a surge in surface water temperature of 1.03°C in southern waters over 51 years (Han and Lee 2020). Moreover, daily water temperature observations along the Yeosu Coast, strongly influenced by the TWC during

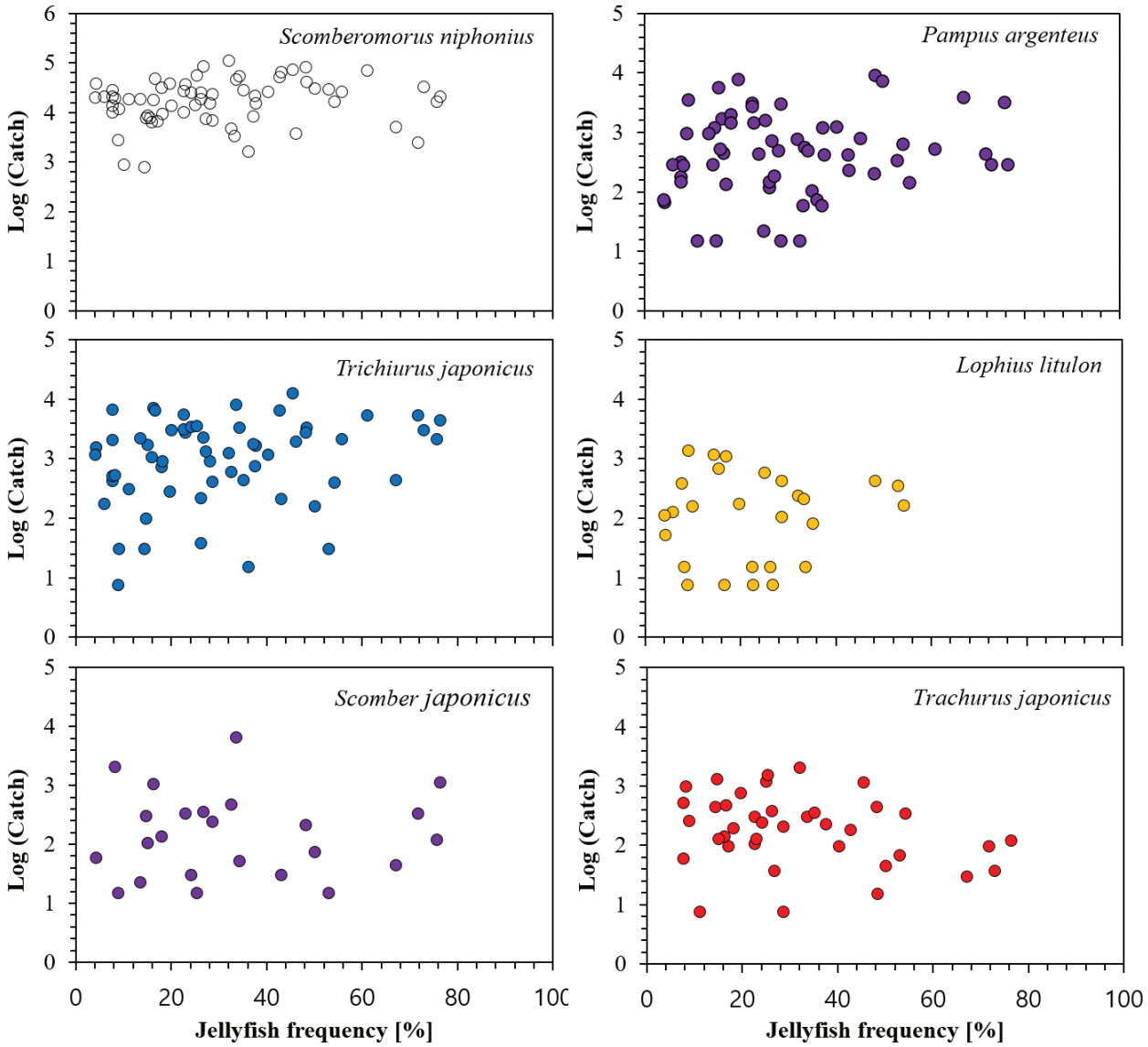

Figure 6. Correlations between monthly occurrence ratios of jellyfish and log-transformed catches of major fish species captured in daily set nets in the Yeosu Coast, Korea during 2008–2022.

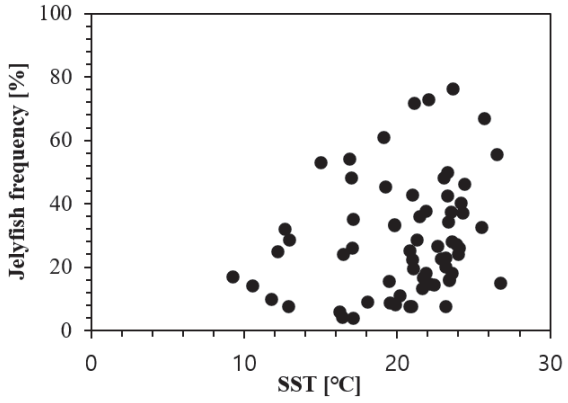

Figure 7. Correlations between monthly mean sea surface temperature (SST) and occurrence ratio of jellyfish from daily set-net catch in the Yeosu Coast, Korea during 2008–2022.

summer, have resulted in water temperatures higher than those previously recorded. This conducive environment facilitated the emergence of subtropical fish species.

Fishing season and impacts of climate change. The fishing season of the Yeosu coastal set nets spans from spring (March and April) to early winter (December), with the peak catch concentrated in the fall months of October and November. Notably, *Engraulis japonicus* emerged as the primary target species at the beginning of the fishing season, extending from April to June. Subsequently, *Scomberomorus niphonius* became the main target species, mirroring the transition observed in the dominant species highlighted by Kim et al. (2013) in their study of the same waterbodies between 2004 and 2011. This shift can be attributed to the increased water temperatures along the southern coast over the last two decades. These elevated temperatures have facilitated the optimum water temperature conducive to supporting warm-water species such as *Scomberomorus niphonius* and *Engraulis japonicus*. Their integration into the coastal set-net fishery may be a response to the TWC inflows from the outer sea (Kim et al. 2013). The relation between fish species composition, catch, and environmental factors was explored in a study

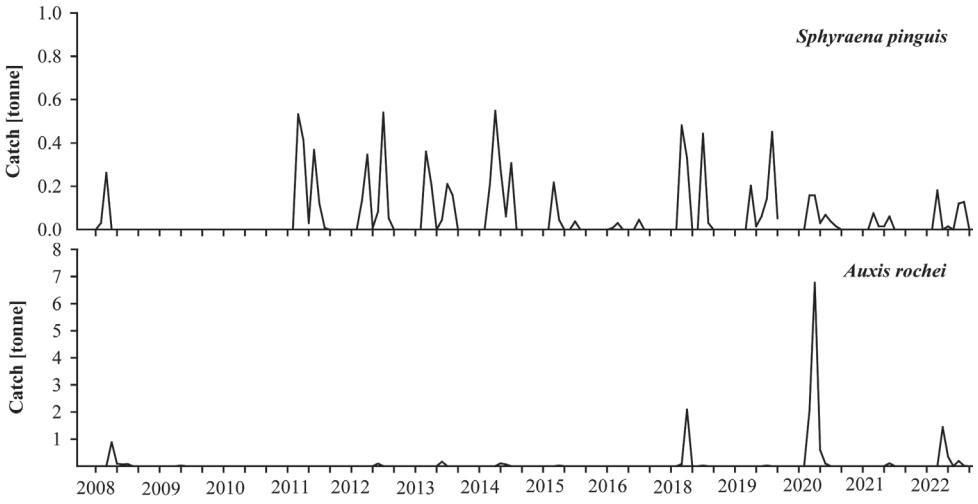

Figure 8. Annual catches of subtropical fishes from daily set-net catch in the Yeosu Coast, Korea during 2008–2022.

Table 2. Comparison of the sampling area, period, gear, and dominant species of fish collected using set nets in the coastal waters of Yeosu, Korea during 2008–2022.

Parameter	Reference		
	This study	**Hwang et al. 2006**	**Kim et al. 2013**
Sampling area	Yeosu coast	Yeosu coast	Yeosu coast
Sampling period	2008–2022	2002–2003	2004–2011
Sampling gear	Large set net	Large set net	Large set net
Dominant species	*Scomberomorus niphonius*	*Scomberomorus niphonius*	*Scomberomorus niphonius*
	Engraulis japonicus	*Seriola* spp.	*Engraulis japonicus*
	Pampus argenteus	*Sarda orientalis*	*Pampus argenteus*
	Trichiurus japonicus	*Engraulis japonicus*	*Trichiurus japonicus*
	Pampus punctatissimus	*Lophius litulon*	*Lophius litulon*
	Lophius litulon	*Trichiurus japonicus*	*Sarda orientalis*

by Kim et al. (2013), who found strong correlations among water temperature, frequency of jellyfish appearance, and species composition of fish joining the Yeosu coastal set-net fishery. Although water temperature and jellyfish frequency showed high correlations, no clear relation was established with the number of fishing days affected by typhoons. Consequently, water temperature evidently exerts the most significant influence on the Yeosu coastal set-net fishery, although the rate of jellyfish emergence may also play a role. Over the past decade, substantial jellyfish outbreaks have negatively affected fishery production in Korea, China, and Japan, which has damaged fishing gear, spoiled fish with jellyfish contamination, and caused predation of fish eggs and larvae. These events contributed to a potential reduction in the abundance of commercial fish species. Rising water temperatures are closely associated with jellyfish outbreaks (Kang et al. 2000; Uye 2008; Kim et al. 2013; Yoon et al. 2014), and large-scale outbreaks have been reported in Korean coastal waters since 2003 (Lee et al. 2008; Oh et al. 2021). Moreover, the increasing frequency and number of jellyfish, along with their earlier emergence and delayed disappearance, can potentially affect fishing operations and commercial fish species abundance by interfering with fixed gear such as set nets. This underscores the importance of developing strategies to mitigate jellyfish damage in set-net fishing areas in the future (Kim et al. 2013; Yoon et al. 2014; Song et al. 2015). *Scomberomorus niphonius*, a prominent catch in the Yeosu coastal set nets, is a migratory fish captured off the South Sea coast. It occupies a significant position in the food chain of this ecosystem as a representative piscivorous fish. Its diet primarily comprises anchovies, hairtails, and mackerel (Huh et al. 2006; Lee et al. 2011). As a pelagic species, the coastal recruitment of *Scomberomorus niphonius* is closely associated with the distribution of its prey species. *Engraulis japonicus* that enter the *Scomberomorus niphonius* spawning grounds on the southern and western coasts in May are crucial prey (Shoji and Tanaka 2005; Kim et al. 2013; Zhang et al. 2022). Additionally, *Trichiurus japonicus*, which prefers anchovies as prey, contributes to the dynamics of the *Scomberomorus niphonius* diet (Huh et al. 2006; Lee et al. 2021a). *Scomberomorus niphonius* catch has two peaks, one in spring and the other in fall, aligning with the timing of *Engraulis japonicus* and *Trichiurus japonicus* recruitment into the set-net fishery. The migration pattern of *Scomberomorus niphonius* from warm outer seawater to the South Sea coast for spring spawning coincides with the inward migration of *Engraulis japonicus*, their primary prey, to the same area. This synchronization highlights the potential importance of *Engraulis japonicus* availability in the recruitment of *Scomberomorus niphonius* to the coast (Kim et al. 2013). Climate change is expected to shift marine biota and fishery ecosystems in South Korea, directly affecting fisheries. Consequently, the importance of assessing the vulnerability to climate change in policy

formulation is increasing (Kim et al. 2023). Additionally, fishery production in South Korea has been steadily declining since 1986 and climate change has caused changes in the species composition and communities of fishery resources (Lee et al. 2021b; Song et al. 2022). Therefore, long-term fish catch records from specific waters are essential to develop effective policies that address the impacts of climate changes on marine ecosystems. The changes in catch observed in the set nets off the Yeosu Coast were similar to those reported by Kim et al. (2013), but the species composition differed. They noted that the catch of *Scomberomorus niphonius* varied according to the catch rate, except in 2016. Importantly, the catch rate has been increasing over time, and the species composition has also changed. Set nets offer advantages for quantifying the recruitment and catch of settled pelagic and coastal fish species. The location where the gear is deployed and variations in sea conditions, including water temperature, influence the catch (Kim et al. 2003; Hwang et al. 2006; Kim et al. 2013). Notably, these nets allow effective analysis of the seasonal and annual catch characteristics of commercial fish species. However, in the future, continuous collection of data, such as the occurrence of subtropical fish species, bycatch during fishing, and body composition of commercial fish species through direct engagement with fishing vessels, will provide ecological evidence to conserve and sustain coastal fishery resources of Yeosu under the influence of climate change.

Acknowledgments

This study was supported by a grant from the National Institute of Fisheries Science (NIFS) of Korea (grant number R2024010). This research was supported by the Korea Institute of Marine Science and Technology Promotion (KIMST) and funded by the Ministry of Oceans and Fisheries (20210044).

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