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Occurrence of the Sickle Pomfret *Taractichthys steindachneri* (Döderlein, 1883) in Palawan Waters with Notes on Pomfret Fishery in the Philippines

Występowanie gatunku *Taractichthys steindachneri* (Döderlein, 1883) w wodach na wyspie Palawan oraz informacje na temat połowów ryb z rodziny Bramidae na Filipinach

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Abstract: Deep-sea species, although bizarre and odd-looking organisms, also warrant scientific and conservation attention. However, information on their occurrence and fishery throughout their distribution remains limited, hindering the development of effective conservation strategies. This paper contributes to addressing this gap by providing information on the occurrence of Sickle Pomfret Taractichthys steindachneri (Döderlein, 1883) in Palawan waters and notes on pomfret fishery in the Philippines. Two individuals were encountered for sale at the Puerto Princesa City New Public Market on 26 February 2023 and were photographed alongside a size reference. Standard (SL) and total lengths (TL) were measured using CPCe software, revealing significant sizes - 538.1 mm SL and 683.6 mm TL for the first individual, and 574.0 mm SL and 741.1 mm TL for the second, exceeding the previously recorded maximum lengths. Molecular sequencing further validated the species' identity. Although seldom observed in the markets, the species are caught in deep trenches of the Sulu and West Philippine seas. In total, eight pomfret species are recorded in the Philippines, however, comprehensive information on the catch volume, fishing grounds, and other biological attributes of these species are needed to promote sustainable utilization and management.

Keywords: Bramidae, bony fish, deep-sea species, fish diversity

Streszczenie: Przy całym swoim dość dziwacznym wyglądzie, gatunki głębinowe, warte są uwagi naukowców i ochrony. Jednak informacje na temat ich występowania i połowów pozostają nadal ograniczone, co utrudnia opracowanie skutecznych strategii ochrony tych zwierząt. Niniejszy artykuł przyczynia się do wypełnienia tej luki, dostarczając informacje na temat występowania gatunku *Taractichthys steindachneri* (Döderlein, 1883) w wodach wokół

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wyspy Palawan oraz na temat połowów ryb z rodziny Bramidae na Filipinach. 26 lutego 2023, sfotografowano i opatrzono informacją o rozmiarach dwa osobniki wystawione na sprzedaż na targu w mieście Puerto Princesa. Standardową (SL) i całkowitą długość (TL) ryb zmierzono za pomocą oprogramowania CPCe. Uzyskane wartości, odpowiednio 538,1 mm SL i 683,6 mm TL dla pierwszego osobnika oraz 574,0 mm SL i 741,1 mm TL dla drugiego, przekroczyły dotychczas zarejestrowane maksymalne długości. Zastosowane metody genetyczne potwierdziły identyfikację gatunku. Chociaż rzadko spotykane na targach, gatunki z rodziny Bramidae są łowione w głębokich rowach mórz Sulu i Zachodnich Filipin. Ogółem na Filipinach odnotowano osiem gatunków z rodziny Bramidae, jednak w celu zapewnienia zrównoważonego połowu i zarządzania potrzebne są szczegółowe informacje na temat wielkości połowów, łowisk oraz cech biologicznych tych gatunków.

Słowa kluczowe: Bramidae, ryby kostnoszkieletowe, gatunki głębinowe, różnorodność ryb

Introduction

The family Bramidae Bonaparte 1831, commonly referred to as pomfrets, is an oceanic fish group distributed across the Atlantic, Indian, and Pacific oceans (Froese and Pauly 2024; Masuda et al. 1984; Motomora et al. 2017). They are comprised of 20 species scattered in seven genera (Gilbert et al. 2021) and may reach up to 1000 mm long (attained in *Taractichthys longipinnis*) (Froese and Pauly 2024). The family is characterized by a single dorsal fin, extending over the length of the body in some species, with unbranched anterior spines, and without anal spines (Froese and Pauly 2024; Gilbert et al. 2021).

Within the pomfret family, *Taractichthys* Mead and Maul, 1958 is comprised only of two highly migratory species: *Taractichthys longipinnis* (Lowe, 1843) which is predominantly found in the Atlantic Ocean at 0-500 m deep, and *Taractichthys steindachneri* (Doderlein, 1883) which is distributed in Indo-Pacific Ocean at depths of 50-700 m (Froese and Pauly 2024). In the Philippines, *T. steindachneri* was first reported in the Sulu Sea (Promjinda and Siriraksophon 2007) but provided little biological information. Several YouTube and Facebook videos showed pomfrets being caught in some parts of the country that look similar to *T. steindachneri* (e.g., JaySpot Fishing TV 2024; Pinoy Jigger TV 2024; Ralph Fishing and MOTO 2024), but the exact identities of the species need verification. The species was not reported anywhere since then, until recently, when Motomura et al. (2017) reported their presence in fish markets around Panay Island and Bemis et al. (2023) collected a sample from La Union for their DNA barcoding effort in the country.

The Palawan archipelago is renowned for its rich marine diversity, including 1,056 marine fish species (Balisco et al. 2023). Previous marine fish inventory studies in Palawan have primarily focused on a specific group of taxa (e.g., Pomacentridae - Villanueva et al.

2023), commercially important species (e.g., Gonzales 2013; 2018), common species caught by fishing gears (e.g., Gonzales 2018; Balisco et al. 2019), and reef-dwelling species (e.g., Balisco and Dolorosa 2019). However, little to no attention has been given to deep-sea ecosystems and their inhabitants despite their scientific significance amidst threats from anthropogenic activities and changing climates (Robison 2009). The decline in ecosystem quality (Dolorosa et al. 2024; Climaco et al. 2023; Dolorosa et al. 2023; Tahiluddin and Sarri 2022; Fabro 2016; Licuanan et al. 2017) previously supporting progressive coastal fisheries has led to a gradual shift from shallow water into deep-sea fishing activities, uncovering new insights into the diverse deep-sea fish populations around Palawan.

While monitoring fish sold in a public market in Puerto Princesa City, we encountered samples of unusually large black fish identified as *T. steindachneri* constituting the first market record in Palawan. Herein, we also present the first molecular sequence of a Palawan specimen and offer insights into pomfret fisheries in the Philippines, aiming to contribute information about this less-known deep-sea species.

1. Materials and Methods

1.1. Data Collection

Two individuals of unusual, black-colored fish were seen displayed in one of the fish stalls of Puerto Princesa City New Public Market (PPCNPM) in Palawan, Philippines on 26 February 2023 (Figure 1). According to the fish vendor, the fish were caught using a long line somewhere in the northern part of Palawan. The specimens were photographed alongside a size reference and their sizes (standard length, SL; total length, TL) were estimated using the Coral Point Count with Excel extensions (CPCe) program (Kohler and Gill 2006). Additional information was obtained from the fish vendor, and a fin clip from one of the samples was collected, preserved in 95% ethanol, and frozen at -20°C before DNA extraction.



Figure 1. A photograph of one of the two unusual black fish (741.1 mm TL) displayed for sale in Puerto Princesa City Public Market, Palawan, Philippines. Note: A Philippine peso coin is used as a size reference. (Photo by R.G. Dolorosa).

Information about its fishery in the Philippines were obtained from the Key Informants (KIs) composed of fish vendors in the PPCNPM, and eight other personal contacts of the authors who provided information about the capture or sale of the pomfrets in their locality. The names of the seven KIs who provided information through personal messages were withheld for privacy purposes. Social media posts on FaceBook (https://www.facebook.com) and YouTube (https://www.youtube.com) were searched to document the extent of pomfret fishery in the country. Keywords such as "pomfret", "Black Pomfret", "Pacific Pomfret", "Isdang Tabas", and "Tabas-tabas" were used when searching for related videos. In total, 13 FaceBook and 17 YouTube posts were found (Appendix).

1.2. Data Analysis

DNA extraction was conducted using a GeneMark DNA Purification Kit following the manufacturer's protocol (GMbiolab, Taichung, Taiwan). The mitochondrial cytochrome c oxidase subunit I (*COI*) gene was amplified by polymerase chain reaction (PCR) using FishF1 and FishR1 primers (Ward et al. 2005). The PCR thermal cycling conditions, quality checking, PCR product purification, and DNA sequencing followed the protocol used by Thu et al. (2019). The *COI* sequence was compared to sequences from GenBank (Clark et al. 2016; www.ncbi.nlm.nih.gov/genbank), assembled and examined using Molecular Evolutionary Genetics Analysis (MEGA version 11) software (Tamura et al. 2021), and used to build a maximum likelihood (ML) tree using the HKY+ *Γ* model (best-fit model using 'Find Best DNA/Protein models) with 1,000 bootstrap iterations (Felsenstein 1985). The photos were used

for the initial identification of the samples based on morphological characters, while confirmation of the species was conducted using the *COI* sequence.

Information obtained from social media posts and KIs were visually presented on a map to show the distribution and occurrence of pomfret fishery in the Philippines. Data gathered were further supported and confirmed with literatures, including the works of Bos and Gumanao (2013), Fortaleza et al. (2024), Ganaden and Lavapie-Gonzales (1999), Motomura et al. (2017), and Promjinda and Siriraksophon (2007).

2. Results and Discussion

2.1. Species Identification

Two individuals encountered in PPCNPM exhibit distinctive characteristics that we have not previously observed. Based on the photos taken, the specimens have a black coloration and predominantly large, hard-to-remove scales covering their bodies, extending to the dorsal and anal fins. Their mouths are nearly vertical, with the upper jaw extending to a vertical through the anterior of the eye. Additionally, a white thick margin is also apparent in their caudal fin. The pelvic fin is small, with half of the anterior tip having a distinct white coloration (see also Masuda et al.1984). The first individual measured 538.1 mm SL and 683.6 mm TL, while the second individual was larger at 574.0 mm SL and 741.1 mm TL. Both morphological characters and molecular sequences confirmed the species' identity as *Taractichthys steindachneri* (Döderlein 1883), belonging to the family Bramidae (Figures 1 and 2).

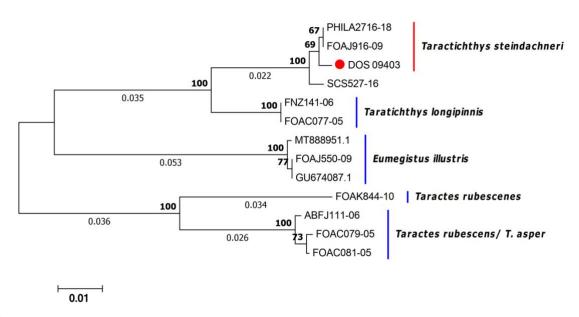


Figure 2. Unrooted maximum likelihood (ML) tree using partial *COI* sequences (565 bp) among the selected species of Bramidae. Numerals beside the internal branch are the bootstrap

support using 1,000 iterations; values below 50 are not shown. Numerals beside long branches are genetic distances. Red circle represents the *Taractichthys steindachneri* collected from Puerto Princesa City New Public Market, Palawan, Philippines.

According to the fish vendor, the thick scales of this species require scraping before cutting, hence, locally called "*Tabas-tabas*" which means "to use a sharp knife to thinly scrape off the scales and skin". The fish vendor also mentioned that in addition to the sampled individuals, there were also 18 other individuals kept in an icebox, all weighing approximately 100 kg. Interestingly, no similar fish has been observed in the fish market since then. Nearshore fishing, targeting shallow high-valued reef-dwelling and pelagic species remained popular in Palawan although deep-sea fishing has gradually gained attention recently. However, pomfrets continue to be regarded as bycatch and are not sold in the local market due to low market value, unattractive dark coloration, limited demand, and a lack of familiarity among the local consumers.

The description of our Palawan samples aligns with the species description provided by Masuda et al. (1984) and Shao (2024). The species, inhabiting the Indo-Pacific Oceans is known for its highly migratory behavior. The sizes of two individuals we observed (683.6 mm TL, and 741.1 mm TL) exceeded the maximum reported size for this species (600 mm TL) (Froese and Pauly 2024). However, Kindong et al. (2020) reported larger individuals reaching 920 mm forked length, suggesting high chances of capturing larger individuals in other fishing grounds within the country.

In Japan, the species has been reported to attain 600 mm SL and is distributed in Sagami Bay, Niigata Prefecture. The fish is widely found in the tropical and temperate areas of the Indo-Pacific region, except for the southeastern Pacific (Masuda et al. 1984; Nakabo 2013). Despite its widespread distribution, only Motomura et al. (2017) reported that juveniles are frequently caught in February around Panay Island. The species has not been previously mentioned in other literature on Philippines fishes, such as Herre (1953), Ganaden and Lavapie-Gonzales (1999), and Broad (2003). This indicates that deep-sea species were less exploited during those periods, resulting in little information about their occurrence and distribution in the country.

2.2. Pomfret Fisheries in the Philippines

Although seldomly displayed in the public markets in Puerto Princesa City, *T. steindachneri* is commonly sold in Negros Island, on the east side of the Sulu Sea. According

to one of the KIs, the fish landed in Negros (Figure 3) are caught offshore using a baited long line in the West Philippine Sea (WPS) particularly on the western side of Mindoro Island and in the southeastern parts of the Sulu Sea (Figure 4). Fishing of this species is a year-round activity, except during unfavorable weather conditions. Individual fish caught may reach lengths of up to 700 mm and weigh between 3 and 10 kg each, fetching a local selling price of \$\frac{1}{2}\$160.00 per kilogram. Another KI showed a photo containing three individuals of *T. steindachneri* confiscated from a fishing boat apprehended in Tubbataha Reefs Natural Park (in the middle of the Sulu Sea) on April 13, 2024. In addition, a FaceBook post also showed one *T. steindachneri* caught between Panay and Guimaras Islands (Figure 4, Table 1).

The pomfret species in other uploaded photos and videos look different from *T. steindachneri*, instead, these resemble *Brama orcini* Cuvier, 1831 and *Eumegistus illustris* Jordan and Jordan, 1922, but these require actual examination of samples for further validation. The fishing grounds of *T. steindachneri* and other pomfret species obtained from social media posts and correspondence from the KIs are shown in Figure 4. The posted videos and photos suggest a thriving small-scale pomfret fisheries all over the country, except in the northern and northeastern parts. Among the sites, Zambales had the highest number of posts and the greatest abundance of catch, likely due to the encouragement of the Philippine government to fish in the West Philippine Sea (Nepomuceno 2021).





Figure 3. Sickle pomfrets *Taractichthys steindachneri* loaded in a truck (left) and displayed for sale in a village (right) in the Negros Island, Philippines. Note the small black pelvic fins with white color anteriorly. (Photos by Concepcion S. Paz).

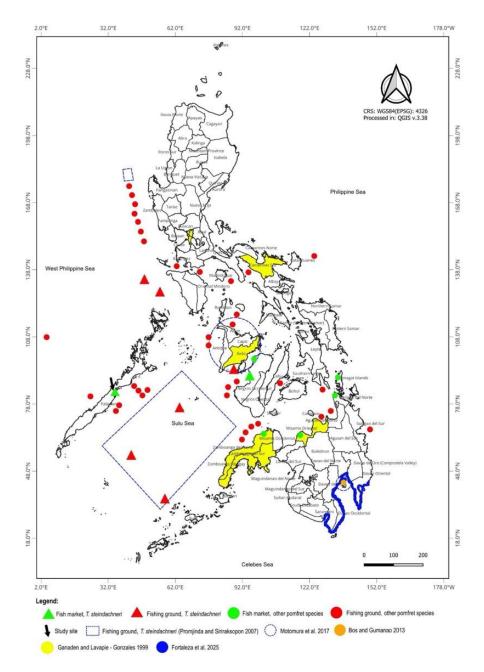


Figure 4. The updated fishing grounds of *Taractichthys steindachneri* and other pomfret species in the Philippines. (The map was generated using QGIS version 3.28).

Due to the abundance of reef fishes in Palawan, fishing activities are more concentrated on nearshore reef areas, thus records of deep-sea caught species are very rare, with reports primarily confined in the middle of the Sulu Sea, Zambales and the west coast of Borneo particularly in Brunei Darussalam waters (Promjinda and Siriraksophon 2007). In addition, Motomura et al. (2017) reported that juvenile *T. steindachneri* were frequently caught in February around Panay Island. The commercial capture of the species in WPS particularly on

the western side of Mindoro Island, and Iloilo Strait further validated the known fishing ground of the species (Figure 4).

While there are plenty of online photos and videos of the captured pomfret species, information about which species are harvested from each locality is lacking. To confirm the identity of these species, there is a need to examine actual fish samples for morpho-meristic and molecular analyses. Aside from *T. steindachneri*, only a few studies have reported the presence of other seven pomfret species (Family Bramidae), thus, makes a total of eight species for the Philippines. For example, Bos and Gumanao (2013) found Brama orcini and Eumegistus illustris in a fish market in Samal Island in Davao Gulf, southern Mindanao. Of the 771 marine species in Southern Philippines recently reported by Fortaleza et al. (2024), 130 are deep reef inhabitants including three species of Bramidae, namely Brama dussumiere, B orcini and E. illustris from Davao Del Sur and Davao City, suggesting that deep water fisheries in Davao Gulf have been active. Moreover, Ganaden and Lavapie-Gonzales (1999) reported four species (B. dussumiere, B. orcini, B. brama and B. japonica) in different parts of the Philippines, including Manila, Albay, Camarines Iloilo, Cebu, Zamboanga, Cagayan de Oro City, and Misamis Oriental. Lastly, Motomura et al. 2017 reported four species (Brama pauciradiata, B. dussumiere, Taractes rubescens and T. steindachneri) found in the markets around Panay Island and one species (B. orcini) in a Samal Island fish market.

Pomfrets are widely distributed with nine species known to occur in Japan (Nakabo 2013) and eight species were recorded in Taiwan (Shao 2024), out of the 20 extant species recorded globally (Froese and Pauly 2024), suggesting that more species are possibly awaiting to be discovered within the Philippines waters.

Although Balisco et al. (2023) reported more than 1,056 marine fish species from Palawan, the list does not include any pomfrets (Bramidae). These species are characterized by their unconventional appearances, preference for deep water habitats, and rarity in Palawan markets, likely due to their limited appeal to potential buyers. In contrast, a different scenario is observed on Negros Island where truckloads of *T. steindachneri* are frequently sighted, indicating that this species is regularly consumed on the island and in nearby areas.

Alongside the commercial deep-water fisheries, artisanal and recreational fishing which includes, among others, the capture of pomfret, is becoming a common activity in the Philippines as featured in the FaceBook pages and groups (e.g., Pinoy Jigging TV 2024), JaySpot Fishing TV 2024) and Ralph Fishing and MOTO 2024). The ongoing deterioration of

coastal resources (Climaco et al. 2022; Dolorosa et al. 2023; Dolorosa et al. 2024; Macusi et al. 2021) in the country and many parts of the world (Pomeroy et al. 2016) has forced these fishers to venture out farther places and deeper waters. However, unregulated deep-sea fishing poses significant threats to the country's fragile deep-water ecosystems (Post et al. 2002; Flores 2004). This underscores the need for policies that prioritize conservation and sustainable utilization of deep-sea species and their habitats (Robison 2009).

Given the scarcity of information on *T. steindachneri* and other pomfret species in Philippine waters, further research into their biology, ecology, and distribution is imperative to inform both local and national policy-making. Determining size at first maturity is particularly crucial for establishing size limits and regulating fishing methods, which will help mitigate overfishing and protect fragile deep-sea ecosystems.

Conclusion

In addition to *T. steindachneri*, other pomfret species are also caught particularly in the waters of Palawan and throughout the Philippines. However, the precise species identification of the species remains uncertain and requires actual examination of specimens deposited in both local and national museums, clear photo-documentation, and, if possible, molecular analyses.

A thriving small-scale pomfret fishery, along with other meso-pelagic species, exists in most part of the country. This fishery requires monitoring to serve as a basis for the sustainable management of the deep-water fish fauna. The lack of information on pomfret fisheries in the northern and northeastern regions of Luzon, and in the southern parts of Mindanao, particularly in the Celebes Sea, underscores the need for further investigation.

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References

- Albarico, Frank Paolo Jay B., Pinky Jee B. Albarico, Candelaria C. Peña, Peithe Ma. Salva, and Cheng-Di Dong. 2021. "Using social media platforms to study the ecology and exploitation of mud lobster in the Philippines." *Philippine Journal of Science* 150 (6B): 1837-1847. https://doi.org/10.56899/150.6B.20.
- Balisco, Rodulf Anthony T., and Roger G. Dolorosa. 2019. "The reef-associated fishes of West Sulu Sea, Palawan, Philippines: a checklist and trophic structure." *AACL Bioflux* 12 (4): 1260-1299. http://www.bioflux.com.ro/docs/2019.1260-1299.pdf.
- Balisco, Rodulf Anthony T., Cristine Joy D. Tahajudjin, and Angeli Claire M. Vigonte. 2019. "Fishing gears and their common catch in two coastal areas of Palawan, Philippines: Implications to fisheries management." *International Journal of Fisheries and Aquatic Studies* 7 (2): 216-222.
- Balisco, Rodulf Anthony T., Victor S. Ticzon, Badi R. Samaniego, Wen-Chien Huang, Benjamin J. Gonzales, and Te-Yu Liao. 2023." Marine fishes of Palawan, Philippines: Species diversity, new records, and conservation status." *Regional Studies in Marine Science* 60: 102825. https://doi.org/10.1016/j.rsma.2023.102825.
- Bos, Arthur R., and Girley S. Gumanao. 2013. "Seven new records of fish (Teleostei: Perciformes) from coral reefs and pelagic habitats in southern Mindanao, the Philippines." *Marine Biodiversity Records* 6: e95. https://doi.org/10.1017/S1755267213000614.
- Broad, Genevieve. 2003. Fishes of the Philippines. Quezon City: Voluntary Service Overseas.
- Clark, Karen, Ilene Karsch-Mizrachi, David J. Lipman, James Ostell, and Eric W. Sayers. 2016. "GenBank." *Nucleic Acids Research* 44 (D1): D67–D72. https://doi.org/10.1093/nar/gkv1276.
- Climaco, Russell B., Geofrey M. Aludia, Niño Jess Mar F. Mecha, Anton Rey B. Cornel, Ace Niño Andrew M. Acebuque, Jomil F. Rodriguez, Jona A. Miguel, Ian D. Menardo, and Roger G. Dolorosa. 2022. "Status of coral reefs, butterflyfishes, and benthic macro-invertebrates in Araceli and Dumaran, Palawan, Philippines." *The Palawan Scientist* 14 (2): 54-64. https://doi.org/10.69721/tps.j.2022.14.2.07.
- Dolorosa, Roger G., Niño Jess Mar F. Mecha, Jemima D. Bano, Krizia Meryl A. Ecube, Elmer G. Villanueva, and Patrick C. Cabaitan. 2024. "Declining population of giant clams (Cardiidae: Tridacninae) in Palawan, Philippines." *Ocean and Coastal Research* 72: e24010. https://doi.org/10.1590/2675-2824072.22130.
- Dolorosa, Roger G., Russell B. Climaco, Jona A. Miguel, Geofrey M. Aludia, and Niño Jess Mar F. Mecha. 2023. "Impact of Super Typhoon Odette on the reefs of northeastern

- Palawan, Philippines." *Journal of Fisheries and Environment* 47 (1): 37-52. https://li01.tci-thaijo.org/index.php/JFE/article/view/258478/176068.
- Fabro, Keith Anthony. 2016. "6-year coastal, marine environment rehab program for Palawan pushed." Accessed September 15, 2024. https://pcsd.gov.ph/6-yr-coastal-marine-envtrehab-program-for-palawan-pushed/.
- Felsenstein, Joseph. 1985. "Confidence limits on phylogenies: an approach using the bootstrap." *Evolution* 39 (4): 783–791. https://doi.org/10.2307/2408678.
- Flores, Jimely O. 2004. "Fisheries in deep-water areas of the Philippines." In *Turbulent Seas: The status of Philippine marine fisheries*, by DA-BFAR (Department of Agriculture-Bureau of Fisheries and Aquatic Resources), 72-78. Cebu City: Dept. of Agriculture: Bureau of Fisheries and Aquatic Resources.
- Fortaleza, Maybelle A., Kevin L. Labrador, Joemarie J. Lanutan, Michael G. Bacus, Junissa M. Consuegra, Jodi Eugenia Lourdes F. del Fierro, Rezelle B. Sobradil, Richelle L. Opina, Joey P. Cabasan, Ariel C. Eballe, Girley S. Gumanao, and Cleto L. Nañola, Jr. 2025. "The marine fishes from southern Mindanao, Philippines, including a DNA barcode reference library of commercially important species." *Bulletin of Marine Science* 101 (0): 1-25. https://doi.org/10.5343/bms.2023.0116.
- Froese, Rainer, and Daniel Pauly. 2024. "FishBase." World Wide Web electronic publication.www.fishbase.org, version (02/2024).
- Ganaden, Salud R., and Fe Lavapie-Gonzales. 1999. *Common and local names of marine fishes of the Philippines*. Metro Manila: Fisheries Resource Evaluation and Environment Services Division, Bureau of Fisheries and Aquatic Resources.
- Gonzales, Benjamin J. 2013. "Field guide to coastal fishes of Palawan." In *Coral Triangle Initiatives on Corals, Fisheries, and Food Security*. USAID World Wildlife Fund Philippines.
- Herre, Albert William. 1953. "Check list of Philippine Fishes." *United States Fish and Wildlife Service Research Report* 20: 977.
- JaySpot Fishing TV. 2020. "Giant pomfret fish (Tabas) / Fishing in the Philippines." *This* [Image attached] [Video]. Facebook. https://www.facebook.com/watch/?ref=search&v=360925305044331&external_log_i d=16433d9f-5f81-45ce-a72f-a4ce1a0f6d6f&q=pomfret%20philippines.
- Kindong, Richard, Feng Wu, Siquan Tian, Jiangfeng Zhu, Xiaojie Dai, Jiaqi Wang, and Libin Dai. 2020. "Biological parameters estimate for the sickle pomfret (*Taractichthys steindachneri*) in the west-central and eastern Pacific Ocean." *Indian Journal of Geo Marine Sciences* 49 (3): 373-381.
- Kohler, Kevin E., and Shaun M. Gill. 2006. "Coral Point Count with Excel extensions (CPCe): A Visual Basic program for the determination of coral and substrate coverage using random point count methodology." *Computers & Geosciences* 32 (9): 1259–1269. https://doi.org/10.1016/j.cageo.2005.11.009.

- Licuanan, Andrea M., Michelle Z. Reyes, Katrina S. Luzon, Marie Angelica A. Chan, and Wilfredo Y. Licuanan. 2017. "Initial findings of the nationwide assessment of Philippine coral reefs." *Philippine Journal of Science* 146 (2): 177-185.
- Macusi, Edison D., Kezia L. Camaso, Anna Barboza, and Erna S. Macusi. 2021. "Perceived vulnerability and climate change impacts on small-scale fisheries in Davao Gulf, Philippines." *Frontiers in Marine Science* 8: 597385. https://doi.org/10.3389/fmars.2021.597385.
- Masuda, Hajime, Kunio Amaoka, Chuichi Araga, Teruya Uyeno, and Tetsuo Yoshino. 1984. *The fishes of the Japanese Archipelago*. Vols. 1 and 2. Tokyo: Tokai University Press.
- Motomura, Hiroyuki, Ulysses B. Alama, Nozomu Muto, Ricardo P. Babaran and Satoshi Ishikawa (eds). 2017. *Commercial and bycatch market fishes of Panay Island, Republic of the Philippines*. The Kagoshima University Museum, Kagoshima, University of the Philippines Visayas, Iloilo, and Research Institute for Humanity and Nature, Kyoto.
- Nakabo, Tetsuji. 2013. Fishes of Japan with pictorial keys to the species. Third edition, Vol. 2.
- Nelson, Joseph S., Terry C. Grande, and Mark V. H. Wilson. 2016. *Fishes of the world*. Fifth edition. New York: John Wiley & Sons. http://dx.doi.org/10.1002/9781119174844.
- Nepomuceno, Priam. 2021. *Filipino fishers encouraged in WPS waters: Esperon*. Accessed January 6, 2024. https://www.pna.gov.ph/articles/1139202.
- Pinoy, Jigger TV. 2019. *Big pomfret fish / Monchong fish. Vertical jigging / Fishing in the Philippines / Iligan Anglers Club* [Video]. YouTube. Accessed October 04, 2024. https://www.youtube.com/watch?v=WjE7CemO7aU.
- Pomeroy, Robert, John Parks, Karina Lorenz Mrakovcich, and Christopher LaMonica. 2016. "Drivers and impacts of fisheries scarcity, competition, and conflict on maritime security." *Marine Policy* 67: 94-104. https://doi.org/10.1016/j.marpol.2016.01.005.
- Post, John R., Michael Sullivan, Sean Cox, Nigel P. Lester, Carl J. Walters, Eric A. Parkinson, Andrew J. Paul, Leyland Jackson, and Brian J. Shuter. 2002. "Canada's recreational fisheries: The invisible collapse?" *Fisheries* 27 (1): 6-17. https://doi.org/10.1577/1548-8446(2002)027<0006:CRF>2.0.CO;2.
- Promjinda, Sayan, and Somboon Siriraksophon. 2007. "Large pelagic resources survey in Southeast Asian waters." Technical Report. Southeast Asian Fisheries Development Center, 1-13.
- Ralph Fishing and MOTO. 2022. *POMFRET FISH landed in slow jigging in the Philippines / offshore fishing / vertical jigging* [Video]. YouTube. Accessed October 04, 2024. https://www.youtube.com/watch?v=IoXcJdDoFeI.
- Robison, Bruce H. 2009. "Conservation of deep pelagic biodiversity." *Conservation Biology* 23 (4): 847-858. https://doi.org/10.1111/j.1523-1739.2009.01219.x.

- Shao, Kwang-Tsao. 2024. "The fish database of Taiwan." Accessed May10, 2024, http://fishdb.sinica.edu.tw.
- Tahiluddin, Albaris, and Jurmin Sarri. 2022. "An overview of destructive fishing in the Philippines." *Acta Natura et Scientia* 3 (2): 116-125. https://doi.org/10.29329/actanatsci.2022.352.04.
- Tamura, Koichiro, Glen Stecher, and Sudhir Kumar. 2021. "MEGA11: Molecular Evolutionary Genetics Analysis Version 11." *Molecular Biology and Evolution* 38 (7): 3022–3027. https://doi.org/10.1093/molbev/msab120.
- Thu, Pham The, Wen-Chien Huang, Tak-Kei Chou, Nguyen Van Quan, Pham Van Chien, Fan Li, Kwang-Tsao Shao, and Te-Yu Liao. 2019. "DNA barcoding of coastal ray-finned fishes in Vietnam." *PLoS ONE* 14 (9): e0222631. https://doi.org/10.1371/journal.pone.0222631.
- Villanueva, Rochele L, Niño Jess Mar F. Mecha, Elmer G. Villanueva, Michael Anthony D. Maga-ao, and Roger G. Dolorosa. 2023. "A checklist of damselfishes (Pomacentridae) from Palawan, Philippines." *The Palawan Scientist* 15 (1): 8-23.
- Ward, Robert D, Tyler S. Zemlak, Bronwyn H. Innes, Peter R. Last, and Paul D. N. Hebert. 2005. "DNA barcoding Australia's fish species." *Philosophical Transactions of the Royal Society B: Biological Sciences* 360 (1462): 1847–1857. https://doi.org/10.1098/rstb.2005.1716.

Appendix: Information obtained through social media about the pomfret fishery in the Philippines

Social Media			Quantity	Weight		Date of			
FB Messenger	FB Posts	YouTube	Location	(pcs) (kg) Species Posting Remarks Link	Link				
Name withheld			Middle of Sulu Sea	3		Taractichthys steindachneri	13.kwi.24	Confiscated from a fishing boat that entered a protected area	
Name withheld			Camia Bay, PPC, about 3 km from the shore)	1	8	other pomfret species	25.sty.24	Eco-tourism fishing activity	
Name withheld			Dinagat Island			other pomfret species	2024	Fish market	
			Surigao City			other pomfret species	2022	Fish market	
Name withheld			Aklan			other pomfret species	2022	Fishing activity	
			Naawan			other pomfret species	2021	Fish market	
Name withheld			Dipolog City			other pomfret species	2005	Fish market, sold at PhP40-120/kg	
Name withheld			Plaridel, Misamis Occidental			other pomfret species	10.maj.24	Fish market	
Name withheld			Quezon Palawan			other pomfret species		Local consumption	
Palawan Fishing Buddies			Lawak Island, Kalayaan Island Group	1		other pomfret species	3.kwi.23	Fishing activity	
	Concepcion Paz		West of Mindoro (Lubang and Sta Cruz); Sulu (Pangutaran Island)			Taractichthys steindachneri	28.paź.21	Large numbers; fish landing site in Hinobaan, Negros Occidental	https://www.facebook.com/concepcion.paz.9828/videos/303342128015539

	Social Media			Quantity	Weight (kg)	Species	Date of Posting	Remarks	Link
FB Messenger	FB Posts	YouTube	Location Quantity (pcs)						
	Reve Española Lagunday		Iloilo Strait between Guimbal and Guimaras Island	1		Taractichthys steindachneri	26.kwi.24	Fishing activity	https://www.facebook.com/reel/468375305803291
	Palawan Fishing Buddy		Puerto Princesa City	4		other pomfret species	4.gru.24	Eco-tourism fishing activity	https://www.facebook.com/photo?fbid=892304296380850&set=pcb.892304333047513
	Pobreng Probinsyana		Antique	7		other pomfret species	8.maj.24	Fishing activity	https://www.facebook.com/search/top/?q=Pobreng%20Probinsyana
	Roy Jigging Vlog		Southern Leyte	1	2.5	other pomfret species	28.kwi.24	Weighing of fish	https://www.facebook.com/tedextidalgo/videos/3564343240495087
	Alvin Labrador		Fishing area, Zambales	16		other pomfret species	4.maj.24	Fish landing site	https://www.facebook.com/photo?fbid=7566318596795381&set=pcb.7566319420128632
	Khael Delos Santos		Fishing, Zambales	19		other pomfret species	3.maj.24	Fishing activity	https://www.facebook.com/100081992247068/videos/365616589832484
	Gian Guanco		Bacolod	5		other pomfret species	5.cze.21	Fish landing site	https://www.facebook.com/groups/636728913853965/user/1442701090
	Emmanuel Pante		San Andres, Catanduanes	1		other pomfret species	28.gru.23	Inside an ice chest	https://www.facebook.com/photo/?fbid=2038949629822084&set=a.145559792494420&comment_id=358812700517488&reply_c
	Cleton Egbalic		Zambales	2		other pomfret species	2024	Fishing activity	https://www.facebook.com/reel/810039590552733
	Bob Marley Villareal		Cauayan Negros, (between Negros and Panay islands)	2		other pomfret species	8.maj.24	Fish landing site	https://www.facebook.com/photo/?fbid=404302755839982&set=pb.1000878078101972207520000

	Social Media			Quantity	Weight		Date of		
FB Messenger	FB Posts	YouTube		(pcs)	(kg)	Species	Posting	Remarks	Link
	Roilan Andal Panopio		Puerto Galera Mindoro fishing ground	6		other pomfret species	19.kwi.24	Fish landing site	https://www.facebook.com/reel/399027032998668
	Peejay Soliman		Pili Camarines Sur		6	other pomfret species	mar.24	Fishing activity	https://www.facebook.com/reel/3629003544034652
		Palawan Fishing Buddy by JJ Orqueza	Inagawan, PPC	1	6.3	other pomfret species	23.kwi.22	Fishing tournament	https://www.youtube.com/watch?v=LJHsmbvJyfw&t=609s
			Roxas	1	7.2	other pomfret species	7.lip.22	Fish landing site	https://www.youtube.com/watch?v=0jbbaESEDUc
			Tinitian Roxas	2		other pomfret species	31.maj.22	Fishing activity	https://www.youtube.com/watch?v=19Pu_XWq4AM&t=261s
		Rapoy Hermogino Fishing	Candelaria Zambales	3		other pomfret species	30.wrz.23	Fishing activity	https://www.youtube.com/shorts/tZeR7BJe8eg
			Zambales	12		other pomfret species	3.paź.23	Fishing activity	https://www.youtube.com/watch?v=PmZ11YYWL2I
			Zambales	20	50	other pomfret species	9.paź.23	Fish market	https://www.youtube.com/watch?v=AwJNNMv5XJk
		Manolo Reyes	Pundaquit Zambales	2		other pomfret species	paź.19	Fishing activity	https://www.youtube.com/watch?v=ck92ICFySBM
		Ocean invader	Lapu lapu Ceby	2		other pomfret species	28.gru.22	Fishing activity	https://www.youtube.com/watch?v=wy0IQYDHtgU
		Ji Seefoods KevZar TV	Antique	2		other pomfret species	7.lis.22	Fish landing site	https://www.youtube.com/shorts/8nw64xVf3jo
		Hanzach 521	Negros Occidental	2		other pomfret species	9.maj.24	Fishing activity	https://www.youtube.com/shorts/ML9QioiWd70
		Kaon ta	Zamboanga del norte Dapitan City	11		other pomfret species	31.gru.23	Fish market	https://www.youtube.com/shorts/f8p10VnrNs0

	Social Media			Quantity	Weight		Date of		
FB Messenger	FB Posts	YouTube	Location	(pcs)	(kg)	Species	Posting	Remarks	Link
		Jayspot fishing TV	Cagwait Surigao del Sur	2		other pomfret species	20.wrz.20	Fishing activity	https://www.youtube.com/watch?v=briBvbS4WJc
		Pinoy Jigger TV	Butuan City	3		other pomfret species	8.lip.19	Fishing activity	https://www.youtube.com/watch?v=WjE7CemO7aU
			Butuan City	1	7.5	other pomfret species	8.kwi.20	Fishing activity	https://www.youtube.com/watch?v=m667wAM2WTY
		Ralph Fishing and MOTO	Surigao	1		other pomfret species	3.lip.22	Fishing activity	https://www.youtube.com/watch?v=IoXcJdDoFeI&t=8s
		Richard Molina Fishing	San Fernando, Romblon	1		other pomfret species	7.lut.20	Fishing activity	https://www.youtube.com/watch?v=VxNF3GIYG-k
		Boy Agwanta Vlogs	Catanauan, Quezon			other pomfret species	16.paź.23	Fishing activity, 1 ice chest	https://www.youtube.com/watch?v=LXLYC2pNgAM
		Katambok_TV	Dipolog City			other pomfret species	20.cze.22	Fish landing site, 3 ice chests	https://www.youtube.com/watch?v=xZFaFlkjSaM
		Dovelyns Channel	Zamboanga del norte			other pomfret species	3.maj.20	Fishing activity, 70 kg (1 ice chest)	https://www.youtube.com/watch?v=x_FQtbj-it4
		Mark Gerald Fishing TV	Lobo Batangas	3		other pomfret species	18.kwi.23	Fishing activity	https://www.youtube.com/shorts/Zey7HKe0Xtk
		J1 Seefoods KevZar TV	Antique	3		other pomfret species	7.lis.22	Fish landing site	https://www.youtube.com/shorts/8nw64xVf3jo
		Hanzach1521	Negros Occidental	1		other pomfret species	9.maj.24	Fishing activity	https://www.youtube.com/shorts/ML9QioiWd70