

Morphometric And Meristic Variations of Threadfin Breems Fish (Family: Nemipteridae) in Kupang: A Comparative Study from Oeba Fish Landing Site and Oesapa Fish Market

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ABSTRACT: Threadfin Bream fish (Nemipteridae) are among the frequently landed species at the Oeba Fish Landing Site and the Oesapa Fish Market in Kupang City, East Nusa Tenggara, Indonesia. These fish are widely consumed by local communities, sold in domestic markets, and exported. This study aimed to analyze the morphometric and meristic characteristics of Threadfin Bream fish and compare the morphological variations of specimens collected from two distinct locations: TPI Oeba and Oesapa Market. The research was conducted from April to May 2023. Four species of Threadfin Bream were identified: *Nemipterus japonicus*, *N. hexodon*, *N. zysron*, and *N. aurora*. A total of 18 morphometric and 10 meristic characters were measured. The recorded total lengths were: *N. japonicus* (215 mm), *N. hexodon* (197 mm), *N. zysron* (247 mm), and *N. aurora* (242 mm). Average meristic characteristics included dorsal fin rays D.X.9, pectoral fin rays P.14, ventral fin rays V.I.5, anal fin rays A.III.7, and caudal fin rays C.20. Additional scale counts ranged as follows: pre-dorsal scales (36–41), lateral line scales (137–142), caudal peduncle scales (26–34), transverse body scales (131–169), and caudal fin height (0.8–1.3 mm). These findings contribute baseline data essential for the conservation and sustainable management of Threadfin Bream populations in the coastal waters of Kupang City.

Keywords: Threadfin Bream; Morphometric; Meristic; Kupang waters

INTRODUCTION

Threadfin bream (*Nemipterus* spp.) is a widely distributed group of demersal fish found in tropical and subtropical waters of the western Indo-Pacific region (Russell, 1993). These species typically inhabit sandy and muddy substrates at depths ranging from 22 to 250 meters (Russell, 1990). Due to their high economic value, Threadfin Breems are considered an important fishery resource throughout the Indo-Pacific (Renjith *et al.*, 2022). In Indonesia, they are commonly found in the waters of Sulawesi (Annisa *et al.*, 2024), Maluku (Taeran & Karman, 2019; Labaro *et al.*, 2022), Java (Lisamy *et al.*, 2023; Hastuti *et al.*, 2017), Sumatera (Sellyndia *et al.*, 2023), Papua (Irian Jaya) (Zulham *et al.*, 2019), and the Nusa Tenggara region (Wora *et al.*, 2024; Malau *et al.*, 2022).

In Kupang City, East Nusa Tenggara, Threadfin Bream is among the most frequently caught and landed fish species, particularly at the Oeba Fish Landing Site and Oesapa Fish Market. These fish are consumed locally, exported to countries such as Singapore and Australia (Malau, 2022), and processed into various fish-based products due to their white flesh, high protein content, and low fat (Wibowo *et al.*, 2015). The increasing market demand and high production rates in Kupang have contributed to intensified fishing pressure on Threadfin Bream stocks. If unmanaged, this situation could lead to overfishing, depletion of stocks, and a decline in catch productivity (Hidayah *et al.*, 2020).

To ensure sustainable management of Threadfin Bream resources, species identification through morphometric and meristic analyses is essential. Morphometric analysis entails the quantitative measurement of external dimensions such as body length, width, and height to evaluate size and shape variation in fish (Rohlf & Bookstein, 1990; Bookstein, 1991). In contrast, meristic

analysis involves the enumeration of countable anatomical traits such as fin rays, scales, and vertebrae that serve as key diagnostic characters in fish taxonomy (Tajbakhsh *et al.*, 2018; Kamboj & Kamboj, 2019). Despite the ecological and economic significance of Threadfin Bream in the region, studies on their morphometric and meristic characteristics in East Nusa Tenggara particularly in the waters of Kupang Bay remain limited. Given this context, the present study aims to examine the morphological characteristics of Threadfin Bream species landed at Oeba Fish Landing Site and Oesapa Fish Market in Kupang. Specifically, it seeks to compare morphometric and meristic variations between specimens collected from these two different landing locations.

MATERIALS AND METHODS

This study was conducted from April to May 2023 at the Oeba Fish Landing Site and Oesapa Fish Market, located in Kupang City, East Nusa Tenggara, Indonesia (Figure 1). This research was conducted in April and May, as this period marks the beginning of the transitional season when the migration patterns and availability of nemipterus in the waters tend to increase during these months due to more stable weather conditions compared to the rainy season. Fish samples were collected using a random sampling method. Specimens were obtained directly from local fishermen and immediately stored in cool boxes containing ice to maintain freshness during transport. A total 84 threadfin bream fish were successfully collected from various types, consisting 62 individuals from the Oeba Fish Landing Site and 22 individuals from Oesapa Fish Market. The samples were then taken to the Exact Sciences Laboratory at Artha Wacana Christian University, Kupang, for morphometric and meristic measurements.

Morphometric identification

Morphometric identification is a quantitative approach used to evaluate morphological variation in organisms, particularly in terms of size and shape (Tajbakhsh *et al.*, 2018). This method involves the precise measurement of body parts and morphological features to assess phenotypic diversity, and it is widely applied in taxonomic, ecological, and population structure studies. In ichthyology, morphometric analysis is typically conducted by measuring key anatomical dimensions, including lengths and depths of various body regions, using standardized protocols (Gustomi & Putri, 2019).

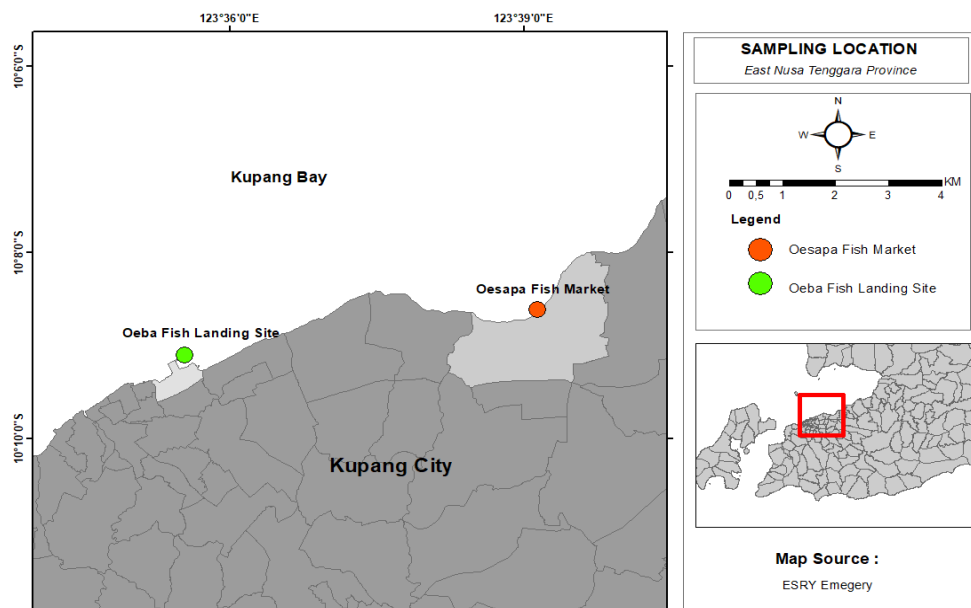


Figure 1. Map of sample collection

In this study, morphometric analysis of *Nemipterus* spp. (threadfin bream) was conducted using 18 morphometric characters: (1) total length (TL), (2) standard length (SL), (3) fork length (FL), (4) dorsal fin base length (DBL), (5) dorsal fin height (DFH), (6) pre-dorsal length (PDL), (7) head length (HL), (8) head depth (HD), (9) eye diameter (ED), (10) interorbital width (IW), (11) body depth (BD), (12) body width (BW), (13) snout length (SNL), (14) pectoral fin length (PCL), (15) pelvic fin length (PVL), (16) anal fin base length (ABL), (17) caudal peduncle depth (CPD), and (18) caudal peduncle length (CPL) (Figure 2).

Meristic identification

Meristic identification involves the enumeration of specific anatomical features in fish, such as the number of scales along the lateral line (linea lateralis), the number of soft and spiny fin rays, and the count of transverse body scales. This method is essential in systematic and taxonomic studies to distinguish between closely related species. The procedure begins by preparing preserved fish specimens, followed by careful observation and counting of measurable meristic traits, including fin rays and scale rows, using magnification tools when necessary (Gustomi & Putri, 2019).

In this study, meristic analysis of *Nemipterus* spp. (threadfin bream) was conducted using ten characters: (1) number of dorsal fin rays, (2) pectoral fin rays, (3) pelvic fin rays, (4) anal fin rays, (5) caudal fin rays, (6) scale count anterior to the dorsal fin, (7) lateral line scale count (linea lateralis), (8) caudal peduncle scale count, (9) transverse scale count, and (10) height of the caudal fin opening (Figure 3).

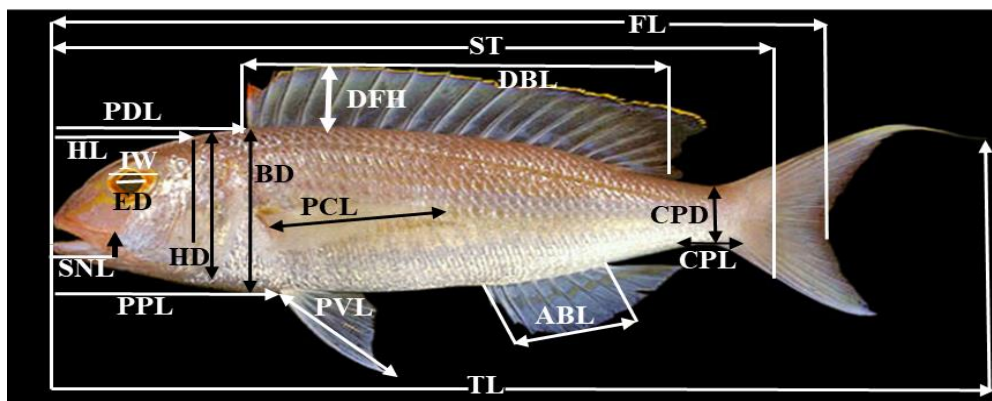


Figure 2. Morphometric Characteristics of Threadfin Bream Fish
(Source, <https://http.www.fishbase.org>)

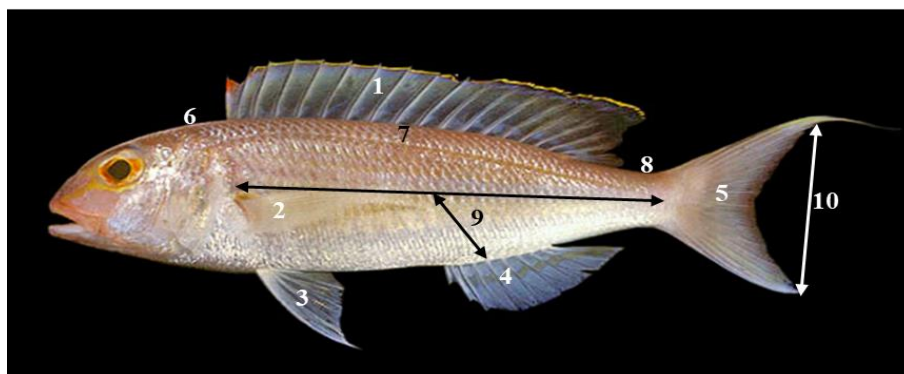


Figure 3. Meristic Characteristics of Threadfin Bream Fish
(Source, <https://http.www.fishbase.org>)

RESULTS AND DISCUSSIONS

Threadfin Bream (*Nemipterus* spp.) are demersal fish commonly found in tropical and subtropical Indo-Pacific waters (Froese, 2025). They are characterized by an elongated, slightly compressed body with a reddish to pinkish coloration. A prominent morphological feature often observed is a continuous golden-yellow longitudinal stripe that runs along the side of the body from the operculum to the caudal fin tip. Additionally, a yellowish-red spot is typically present near the lateral line, serving as an important visual cue for species differentiation (Elhaweet, 2013). The dorsal region is generally pinkish-red, while the dorsal and caudal fins are marked with reddish-yellow pigmentation. According to Russell (1990), individuals of this genus can attain an average body length of up to 250 mm, although this may vary depending on species and environmental conditions.

In general, Threadfin Bream fish (*Nemipterus* spp.) exhibit a moderately rounded and elongated body shape, with a reddish overall coloration (Figure 4). Distinctive morphological and morphometric features used for species identification include a golden-yellow longitudinal stripe extending from the posterior of the head to the tip of the caudal fin, as well as a yellowish-red blotch near the lateral line (Elhaweet, 2013). The head and dorsal areas display a pale reddish hue, while the dorsal fin is tinged with yellowish-red. The typical total length of Threadfin Bream fish is approximately 250 mm (Russell, 1990).

Specimens of Threadfin Bream fish landed at the Oeba Fish Landing Site (TPI Oeba) and the Oesapa Fish Market were identified based on morphometric and meristic characteristics. Four distinct species were identified, primarily differentiated by body coloration. *Nemipterus hexodon* is characterized by a reddish body with a yellow stripe along the upper flank; *Nemipterus aurora* has a slightly rounded, elongated body, a pinkish hue, and a yellowish caudal fin; *Nemipterus zysron* exhibits a pink body with an elongated, rounded shape, a yellow marking beneath the eyes, and a red caudal fin; and *Nemipterus japonicus* displays a reddish body with yellow coloration extending from the posterior of the head to the caudal region.

Morphometric identification

Threadfin Bream fish specimens collected from the Oeba Fish Landing Site and Oesapa Fish Market were visually identified and analyzed through the measurement of 18 morphometric and 10 meristic characters. The results revealed the presence of four *Nemipterus* species at the Oeba landing site and two species at the Oesapa Market, each exhibiting distinct total lengths (TL) across species. For example, *N. hexodon* from the Oeba site had a total length of 242 mm, whereas *N. japonicus* from the Oesapa Market measured 212 mm. These differences indicate interspecific variation in body size. The findings are consistent with the study by Tunya *et al.* (2020) conducted in Thailand, which reported an average body length of *Nemipterus* spp. of 184.2 mm. Additionally,

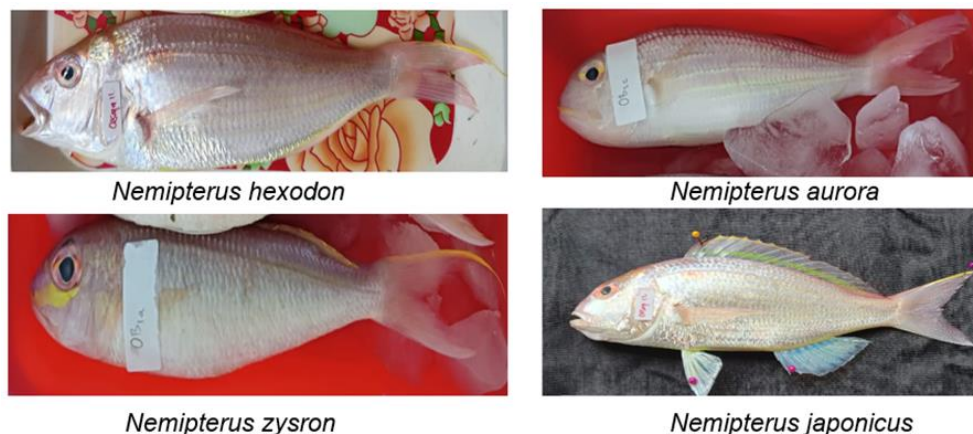


Figure 4. Morphological Identification of Threadfin Bream Fish

standard length (SL) and fork length (FL) measurements revealed that *N. hexodon* tended to exhibit greater body dimensions than the other species, suggesting that this species possesses a more elongated body proportion.

According to Labidi (2021), fish growth is significantly influenced by environmental conditions and food availability. Variations were also observed in the lengths of the pectoral, pelvic, and anal fins between the two locations and among species. For instance, *N. hexodon* from the Oesapa Fish Market had a pectoral fin length of 42.6 mm, whereas specimens from the Oeba site measured 45.4 mm. Such differences may reflect species-specific adaptations to local environmental conditions. Environmental factors play a critical role in shaping morphometric traits in fish. Guill *et al.* (2003) stated that morphological changes in fish body shape can occur as adaptive responses to habitat variations, allowing species to modify their physiology and behavior in response to ecological conditions.

Meristic identification

Meristic traits refer to countable anatomical features in fish, such as the number of scales along the lateral line and the number of soft and spiny rays on the fins. In this study, ten meristic parameters were measured in Threadfin Bream fish, including dorsal fin rays, pectoral fin rays, pelvic fin rays, anal fin rays, caudal fin rays, pre-dorsal scales, lateral line scales, caudal peduncle scales, transverse body scales, and caudal fin opening height.

Observations of Threadfin Bream specimens collected from TPI Oeba and Oesapa Fish Market showed that the dorsal fin typically consisted of 10 spiny rays (D.X) and 9 soft rays. These findings are consistent with Gustomi & Putri (2019), who reported that *Nemipterus* species landed at the Sungailiat Fishing Port (PPN Sungailiat) had 10 dorsal spines and 8–9 soft dorsal rays. The number of pectoral fin rays observed in the current study varied across species, ranging from 14 to 17, while pelvic fin rays ranged from 4 to 5.

Table 1. The average morphometric measurements of Threadfin Bream collected from Oeba Fish Landing Site and Oesapa Fish Market

Karakter Morfometrik (mm)	Oeba Fish Landing Site				Oesapa Fish Market	
	<i>N. japonicus</i>	<i>N. hexodon</i>	<i>N. aurora</i>	<i>N. zyson</i>	<i>N. japonicus</i>	<i>N. hexodon</i>
Total length (TL)	215	242	181	247	212	197
Standard length (SL)	181	199	152	201	181	164
Fork length (FL)	194	210	164	217	188	180
Dorsal fin base length (DBL)	82,6	90,8	70,7	98,1	84,3	76,7
Dorsal fin height (DFH)	18,5	17,7	14,1	19,9	18,3	16,0
Pre dorsal length (PDL)	59,9	63,1	49,6	60,1	58,5	56,1
Head length (HL)	41,1	51,6	35,0	46,9	43,0	38,3
Head depth (HD)	42,0	37,8	35,1	37,0	41,6	42,7
Eye diameter (ED)	6,5	6,1	4,1	7,5	5,5	4,7
Intorbital width (IW)	15,3	16,3	12,1	17,0	14,1	12,1
Body depth (BD)	51,1	46,3	44,6	46,8	50,6	50,9
Body width (BW)	17,6	23,8	16,5	23,3	19,0	14,4
Snout length (SNL)	15,4	19,8	12,7	19,8	16,4	13,0
Pectoral fin length (PCL)	40,5	45,4	35,7	42,5	40,2	42,6
Pelvic fin length (PVL)	36,4	51,4	29,4	42,4	36,3	33,6
Anal fin base length (ABL)		36,3	28,7	29,6	31,7	31,2
Caudal peduncle depth (CPD)	17,9	16,5	15,3	17,7	18,0	17,3
Caudal peduncle length (CPL)	19,9	16,3	13,0	16,9	17,2	18,1

Table 2. Average meristic counts of Threadfin Bream (*Nemipterus* spp.) from Oeba Fish Landing Site and Oesapa Fish Market

Character Meristic	Oeba Fish Landing Site				Oesapa Fish Market	
	<i>N. japonicus</i>	<i>N. hexodon</i>	<i>N. aurora</i>	<i>N. zyson</i>	<i>N. japonicus</i>	<i>N. hexodon</i>
Dorsal rays	D.X.9	D.X.9	D.X.10	D.X.9	D.X.9	D.X.9
Pectoral rays	P.14	P.17	P.16	P.14	P.14	P.17
Ventral rays	V.I.5	V.I.5	V.I.5	V.I.5	V.I.5	V.I.5
Anal rays	A.III.7	A.III.7	A.III.7	A.III.7	A.III.7	A.III.7
Caudal rays	C.23	C.18	C.20	C.21	C.20	C.18
Scales before dorsal fin	36-43	21-45	48-53	38-42	36-41	35-45
Scales along lateral line	127-142	102-122	155-165	137-142	138-142	112-135
Scales on caudal peduncle	25-33	31-36	26-34	27-31	27-30	31-56
Scales across body	143-164	131-169	140-162	149-164	150-159	131-169
Caudal fin opening height (mm)	0,8-1,3	1,4-2,2	0,9-1,2	0,8-1,2	0,8-1,3	1-3,9

These results align with those of Srihari (2020), who reported similar ranges of pectoral (15–17) and pelvic (4–5) fin rays in *Nemipterus* species from Indian coastal waters. Variations in meristic characters among species and sampling locations may be influenced by several environmental factors. According to Crook and Gillanders (2013), factors such as water temperature, salinity, and food availability play a significant role in shaping the growth and development of fish, which in turn may affect meristic traits.

The specimens of Threadfin Bream collected from the Oeba Fish Landing Site (TPI Oeba) and the Oesapa Fish Market in Kupang were identified using visual examination, supported by detailed analysis of morphometric (e.g., total length, standard length, head length) and meristic characteristics (e.g., fin ray counts, scale counts). This approach allows for accurate taxonomic classification and provides essential baseline data for population monitoring and fisheries management. Understanding the morphological variation of *Nemipterus* species in different landing sites is important for distinguishing species with similar external features and for detecting potential stock differences. These findings contribute to the broader effort of sustainable resource management and biodiversity conservation in the region.

CONCLUSION

This study identified four species of Threadfin Bream Fish (*Nemipterus*) from the Oeba Fish Landing Site and Oesapa Fish Market: *N. japonicus*, *N. hexodon*, *N. zyson*, and *N. aurora*. The total lengths of these species varied, with *N. japonicus* measuring 215 mm, *N. hexodon* 197 mm, *N. zyson* 247 mm, and *N. aurora* 242 mm. Meristic characteristics were also recorded, with average counts as follows: dorsal fin rays (D.X.9), pectoral rays (P.14), pelvic rays (V.I.5), anal rays (A.III.7), and caudal rays (C.20). Other features included 36–41 pre-dorsal scales, 137–142 lateral line scales, 26–34 caudal peduncle scales, 131–169 transverse body scales, and a caudal fin opening height of 0.8–1.3 mm. These results provide useful information for identifying and managing *Nemipterus* species in Kupang waters.

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