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Original Article

First account on feeding and reproductive biology of *Aluterus scriptus* (Osbeck, 1765) from the southern coast of India

Rajarajan Tamilselvan[1] • Paulraj Jawahar[2] • Natarajan Jayakumar[3] • Rajagopal Santhakumar[4] • Velu Rani[5] • Shanmugam Sundhar[6] • Thirumal Iyyappan[7] • Esakkimuthu Dineshkumar[7] • Soosaiantony Emiema[7]

[1] *Department of Fisheries Biology and Resource Management, Fisheries College and Research Institute, Tamil Nadu Dr. J. Jayalalithaa Fisheries University (TNJFU), Thoothukudi, Tamil Nadu 628 008, India*
[2] *Mariculture Research Farm Facility (MRFF), Fisheries College and Research Institute, Tamil Nadu Dr. J. Jayalalithaa Fisheries University (TNJFU), Thoothukudi, Tamil Nadu 628 008, India*
[3] *Directorate of Research, Tamil Nadu Dr. J. Jayalalithaa Fisheries University (TNJFU), Nagapattinam, Tamil Nadu 611 002, India*
[4] *Department of Fisheries Extension, Economics and Statistics, Fisheries College and Research Institute, Tamil Nadu Dr. J. Jayalalithaa Fisheries University (TNJFU), Thoothukudi, Tamil Nadu 628 008, India*
[5] *Dr. M.G.R Fisheries College and Research Institute, Thalainayeru, Tamil Nadu Dr. J. Jayalalithaa Fisheries University (TNJFU), Nagapattinam, Tamil Nadu 614 712, India*
[6] *Department of Fish Quality Assurance and Management, Fisheries College and Research Institute, Tamil Nadu Dr. J. Jayalalithaa Fisheries University (TNJFU), Thoothukudi, Tamil Nadu 628 008, India*
[7] *Department of Fishing Technology and Fisheries Engineering, Fisheries College and Research Institute, Tamil Nadu Dr. J. Jayalalithaa Fisheries University (TNJFU), Thoothukudi, Tamil Nadu 628 008, India*

Correspondence
Paulraj Jawahar; Mariculture Research Farm Facility (MRFF), Fisheries College and Research Institute, Tamil Nadu Dr. J. Jayalalithaa Fisheries University (TNJFU), Thoothukudi, Tamil Nadu 628 008, India
jawahar@tnfu.ac.in

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Abstract
Aluterus scriptus (Osbeck, 1765) is a reef-associated fish from the Monacanthidae family. The data on its reproductive and feeding biology are currently scarce. Exploring these aspects is crucial for gaining insights that help in developing effective conservation strategies. A total of 900 specimens of *A. scriptus* were studied from February 2022 to January 2023. The samples were investigated for length-weight relationship, food and feeding habits, sex ratio, length at first maturity, spawning seasonality and fecundity. The observed mean length and weight were 50.2±14.7 cm and 1094±374.4 g, respectively. Growth was negatively allometric, with no significant differences observed between sexes in the length–weight relationship. The mean sex ratio (M:F) of 1:1.53 indicates a female-biased population, with a month-to-month variation in sex ratio. The estimated length at first maturity was 53.33 cm for females and 54.21 cm for males. Reproductive activity is observed throughout the year, with the peak occurring in December. A strong positive correlation was observed between the fecundity and total length (Pearson's $r = 0.986$, $p < 0.001$). Seasonal variation in stomach fullness suggested fluctuations in feeding intensity. Diet analysis revealed a strong preference for coral, followed by small crustaceans, fish, jellyfish, and squid. These findings provide baseline data for the responsible management of *A. scriptus* fishery.

Keywords: *Aluterus scriptus*; feeding biology; reproductive biology; sex ratio

1 | INTRODUCTION

Coral reef and adjacent coastal ecosystems rank among the most productive and structurally complex marine environments, supporting diverse trophic networks and sustaining artisanal and commercial fisheries across tropical regions (Appeldoorn 2018; Dawson *et al*. 2019). Reef-associated fishes regulate benthic communities, influence energy flow and contribute to ecosystem resilience through trophic interactions and reproductive output (Schiettekatte 2021). Understanding species-level feeding ecology and reproductive dynamics is therefore central to evaluate ecological function and informing fisheries management strategies (Brodeur *et al*. 2017; Seong *et al*. 2023).

The scrawled filefish *Aluterus scriptus* (Osbeck, 1765), belonging to the family Monacanthidae, is a circumtropical species inhabiting coral reefs, lagoons and coastal waters (Fermon *et al*. 2022). This species is generally associated with reef environments from shallow coastal waters to depths of approximately 120 m, where it exhibits demersal behaviour and strong habitat association with structured substrates (Froese and Pauly 2026). The species is showed an opportunistic feeding behaviour, consuming a wide range of benthic organisms including cnidarians, algae, and small invertebrates (Livingston 1982). Despite its wide distribution, biological information on its feeding ecology and reproductive biology remains limited, particularly in the Indian Ocean region. Although *A. scriptus* contributes to artisanal and commercial fisheries, it is generally regarded as a species of moderate economic importance. Monacanthids play a role in structuring benthic communities through their feeding activity; however, species-specific ecological information remains scarce. Dietary plasticity among reef fishes has been shown to influence ecological stability, particularly under changing habitat conditions such as coral degradation and shifts in benthic composition (Bellwood *et al*. 2004; Pratchett *et al*. 2006). Feeding studies provide insight into trophic positioning and ecosystem connectivity. Reef fishes often display flexible feeding strategies that reflect habitat complexity and resource availability (Ferreira *et al*. 2004; Hughes *et al*. 2017).

Reproductive biology constitutes a critical component of fish population dynamics. Parameters such as sex ratio, maturity schedule, spawning periodicity, gonadosomatic index and fecundity determine reproductive capacity and influence stock resilience. Tropical marine fishes frequently exhibit extended or multiple spawning periods, often synchronized with environmental cues including photoperiod, productivity pulses, and hydrodynamic regimes (Thresher 1984; Robertson *et al*. 1990). Variability in reproductive timing can enhance larval survival through temporal spreading of spawning events. Size at first maturity and size-dependent fecundity are particularly relevant to fisheries sustainability. Empirical evidence demonstrates that larger females often contribute disproportionately to egg production and recruitment potential (Marshall *et al*. 2010; Venturelli *et al*. 2010). Consequently, these parameters is therefore essential for designing biologically meaningful size regulations and seasonal closures (King and McFarlane 2003; Morgan 2008).

Despite its ecological presence along the southern coast of India, comprehensive studies integrating feeding intensity, diet composition, trophic index, sex ratio, maturity stages, gonadosomatic index and fecundity of *A. scriptus* are lacking. Given increasing fishing pressure and habitat alteration in tropical coastal systems, region-specific baseline data are necessary to evaluate the species' ecological role and demographic resilience. The present study aims to provide a detailed account of feeding ecology and reproductive biology of *A. scriptus* from the southern coast of India.

2 | METHODOLOGY

2.1 Study area and sample collection

A total of 900 specimens of *A. scriptus* were obtained from commercial trawl landings before sorting at Akkarapettai, Thoothukudi, and Kanyakumari fishing harbours along the southern coast of India (Figure 1). Sampling was conducted periodically from February 2022 to January 2023 based on landing availability. On each sampling day, specimens were randomly subsampled from the landed catch to minimize sampling bias. As the samples were derived from fishery-dependent sources, the number of individuals collected per sampling day varied depending on catch volume and availability. The total length (TL) was measured to the nearest millimetre (mm), and the total weight (TW) was measured with a precision of 0.1 g. The specimens were transported to the laboratory of the Fisheries College and Research Institute, Thoothukudi via insulated ice box. Subsequently, the specimens were dissected for analysis of gut content and reproductive biology (Figure 2).

2.2 Feeding intensity, food preference and mean trophic index

The stomachs of the *A. scriptus* specimens were dissected and the gastrosomatic index (GaSI) was calculated following the methodology of Desai (1970). The fullness of the stomach was categorised into six categories: (i) Full, (ii) ¾ full, (iii) ½ full, (iv) ¼ full, (v) Trace and (vi) Empty, as demonstrated by Pillay (1952). Stomach content analysis was performed on 95 specimens with intact stomachs containing identifiable food items, while damaged or highly digested stomachs were excluded from analysis. A chi-square test of independence was used to examine monthly variation in stomach fullness categories. Due to low expected frequencies in several cells, p-values were estimated using Monte Carlo simulation. The gut contents were examined to identify the food items. The food items were grouped into corals, small crustaceans, red and green algae, fish, jellyfish, seagrass, echinoderms and squids. The mean trophic level of *A. scriptus* was calculated using the following formula (Milessi *et al*. 2005):

$$\overline{TL_k} = \frac{\sum_{i=1}^{m} Y_{ik}\, TL_i}{\sum_{i=1}^{m} Y_{ik}}$$

Y_{ik}= landings (tonnes) of species i in year k, and
T_{Li} = trophic level of species

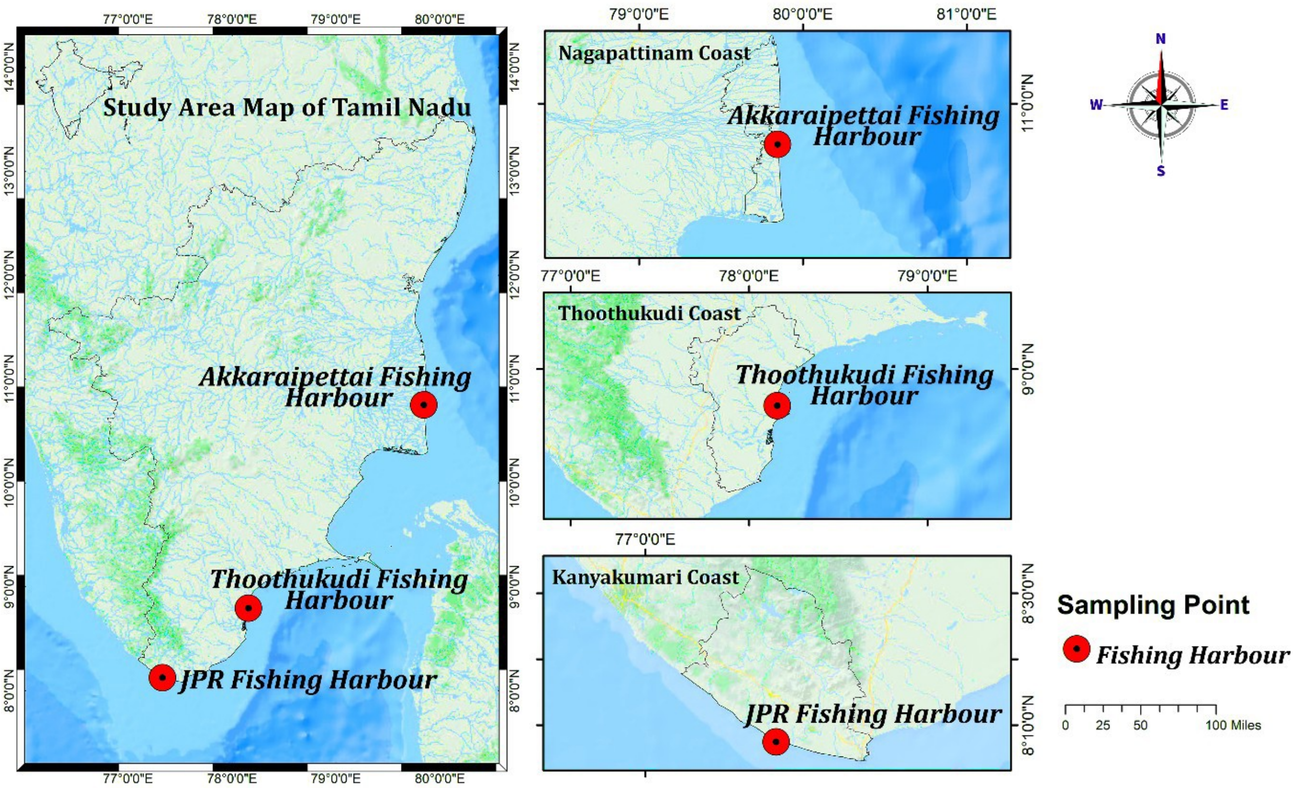

FIGURE 1 Map of the study area showing the sampling stations along the South Tamil Nadu coast of India.

FIGURE 2 Dissected digestive system of *Aluterus scriptus* showing stomach and intestine prior to gut content analysis.

2.3 Sex ratio, length at first maturity (L_m), spawning seasonality and gonadosomatic Index (GSI)

The sex ratio (male:female) was calculated for each month and for the overall sample. Deviations from the expected 1:1 ratio were tested using a chi-square (χ^2) goodness-of-fit test following standard procedures. Statistical significance was evaluated at the 5% level ($p < 0.05$) following the methodology of Snedecor and Cochran 1980. The reproductive stages of male and female fishes were determined using the five-stage gonad maturity scale (Brown-Peterson *et al*. 2011; Figure 3a and 3b). However, due to limited representation of individuals in the mature (Stage III) and spawning (Stage IV) categories, these stages were combined for analysis. Accordingly, gonadal development was grouped into four broader categories: Stage I (immature), Stage II (developing/maturing), Stage III (mature and spawning), and Stage

IV (spent or post-spawning). Ovary characteristics, including colour and vascularisation, shape and size, presence of oocytes, ovary volume in relation to the coelomic cavity and size of the ova, were used to classify the female maturity stages. In contrast, testis size, colour, vascularisation, and presence of seminal fluid were used to classify the male maturity stages.

FIGURE 3 ***(a)*** Maturity stages of testes of *Aluterus scriptus*: Stage I (immature; small, translucent), Stage II (developing & maturing; increased size and vascularisation), Stage III (mature; enlarged, opaque), Stage IV (spawning; turgid with milt release), and Stage V (spent or post-spawning; flaccid with residual spermatocytes). ***(b)*** Maturity stages of ovaries of A. scriptus: Stage I (immature; small, translucent), Stage II (developing & maturing; yellowish with visible oocytes), Stage III (mature; enlarged with distinct yolked oocytes), Stage IV (spawning; hydrated oocytes present), and Stage V (spent or post-spawning; flaccid with residual oocytes).

The length at which 50% of the individuals attain sexual maturity (L_m) was estimated using a logistic regression model, based on the proportion of mature individuals in the stocks as described by Udupay (1986).

$$P = \frac{1}{1 + e^{(-r(L - L_m))}}$$

Where,

P is the predicted proportion of mature individuals,
r is slope of the curve
L is the TL of the specimen
L_m is the length corresponding to proportion of 50% of mature individuals (L_{50}).

Spawning periodicity was assessed based on the percentage of spawning-capable females and males from the monthly proportion. The gonadosomatic index (GSI) was calculated using the following formula (Roff 1983).

$$GSI = GW/SW \times 100$$

Where,

GW is the gonad weight,
SW is the somatic body weight

Fecundity and its relationship with length were estimated using the least squares method following Varghese, 1980. Additionally, absolute fecundity and relative fecundity were also estimated following the methodology of Bagenal (1978). The relationship between fecundity and TL was evaluated using Pearson's correlation coefficient. Statistical significance was assessed at the 5% level ($p < 0.05$).

3 | RESULTS

3.1 Feeding ecology

The TL and weight of the specimens ranged from 25.3 cm to 64.9 cm (mean ± SD: 50.2±14.7 cm) and 141.82 g to 1,891.86 g (mean ± SD: 1094±374.4 g) respectively. A total of 900 stomachs of *A. scriptus* were analysed during the study period. Stomach fullness analysis indicated clear monthly variation in feeding intensity of *A. scriptus* (Figure 4). Higher proportions of actively fed individuals (full and ¾ full stomachs) were recorded during April, July, and October. Increased occurrence of individuals with empty and trace stomachs was observed during June and November, suggesting seasonal variability in feeding activity. Although fluctuations in feeding intensity were observed across months, these differences were not statistically significant ($\chi^2 = 42.46$, $p = 0.930$), indicating relatively consistent feeding patterns throughout the study period.

Aluterus scriptus exhibited a broad omnivorous feeding spectrum comprising both animal and plant matter (Figure 5). Coral fragments and squids were the most and least dominant food items respectively. The trophic index of *A. scriptus* varied marginally across seasons (Table 1). The highest trophic level was observed during post-monsoon (2.98), followed by monsoon (2.75), pre-monsoon (2.73) and summer (2.69). The overall mean trophic index was 2.79±0.06, indicating that *A. scriptus* functions as a low-to-mid level omnivore within the coastal trophic web.

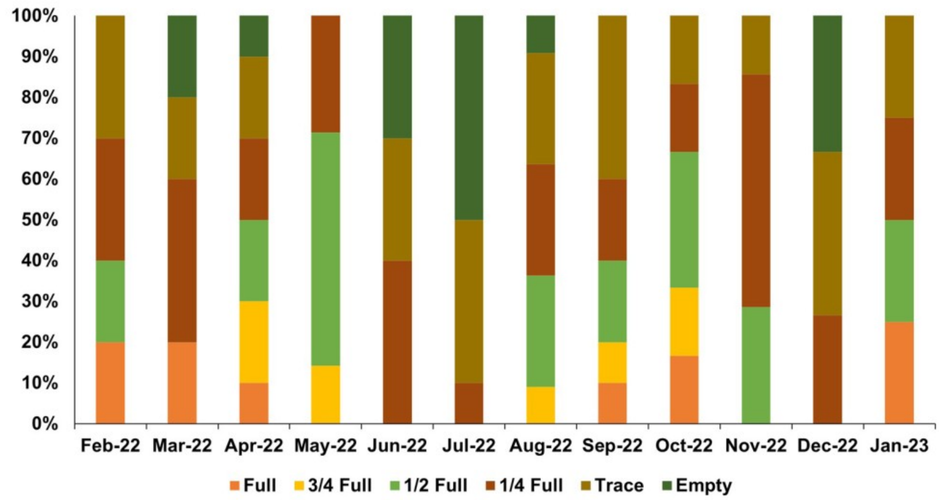

FIGURE 4 Monthly variation in feeding intensity of *Aluterus scriptus*.

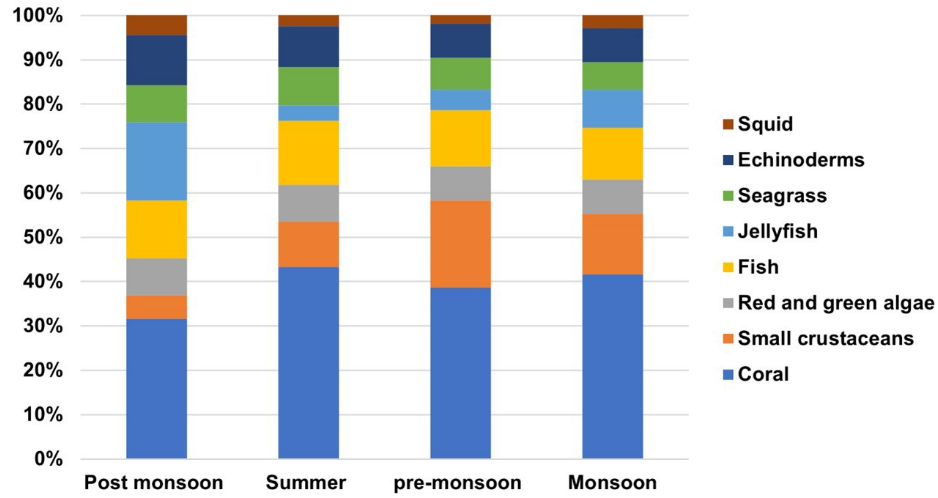

FIGURE 5 Seasonal variation in the diet composition of *Aluterus scriptus*.

TABLE 1 Mean Trophic Index of *Aluterus scriptus*.

Season	Landings (tonnes)	Trophic level
Post monsoon	65,006	2.98
Summer	74,420	2.69
Pre-monsoon	58,694	2.73
Monsoon	20,877	2.75
Mean trophic index		2.79 ±0.06

3.2 Reproductive biology

Among the 900 specimens analysed, 356 and 544 numbers of individuals were observed to be males (39.56%) and females (60.44%) respectively. The overall sex ratio was 1:1.5 (M:F), with the monthly sex ratios ranging from 1:0.6 (January 2023) to 1:4 (June 2022). Monthly sex ratio of *A. scriptus* was given in Figure 6. Chi-square analysis indicated that monthly sex ratios did not differ significantly from the expected 1:1 ratio ($p > 0.05$) in all month. However, the annual sex ratio showed significant deviation ($\chi^2 = 4.17$, $p < 0.05$), indicating female dominance in the population (Table 2). Monthly variation in maturity stages of both male and female *A. scriptus* (Figure 7 and 8) revealed the presence of mature and spawning individuals throughout the year. However, a higher proportion of advanced maturity stages was recorded during October to January.

GSI values further supported seasonal reproductive trends (Figure 9). In females, GSI values ranged from 0.05±0.01 (March 2022) to 2.40±0.38 (December 2022). Higher GSI values were observed from October to January, with peak value during December (2.40±0.38). Male GSI values were consistently lower than females, ranging from 0.04±0.61 (August 2022) to 1.14±0.39 (October 2022), with relatively higher values during October to

December. The relatively high variability observed in certain months, particularly August, may reflect differences in gonadal development stages among individuals and limited sample size. GSI values are inherently variable and often skewed, reflecting the presence of individuals at different reproductive stages. The pooled GSI values substantiates a prolonged spawning period with a major reproductive peak during October to February. The L_m indicated that males attained sexual maturity at larger sizes compared to females (Figure 10). The L_m of male and female *A. scriptus* is estimated as 54.21 cm and 53.33 cm respectively. The maturity ogive showed that 50% of the population reached maturity at approximately the mid-size class of the sampled range, suggesting delayed maturation relative to smaller reef-associated teleosts.

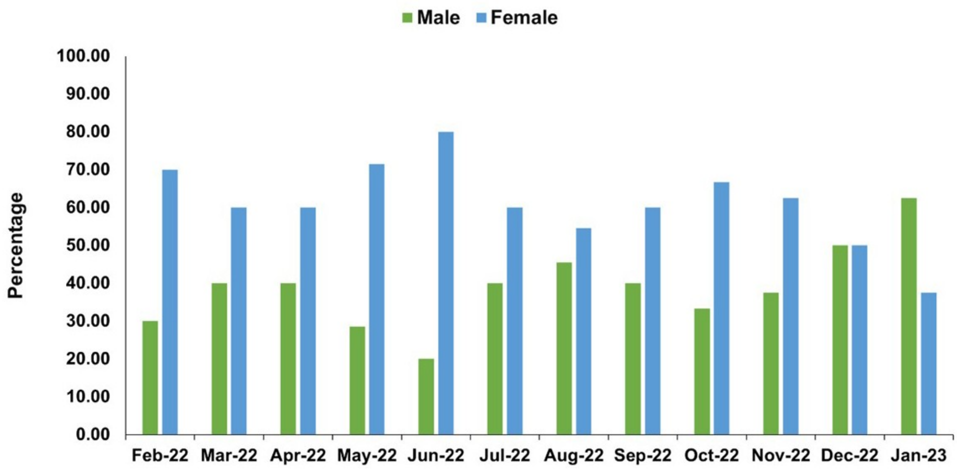

FIGURE 6 Percentage distribution of male and female individuals of *Aluterus scriptus*.

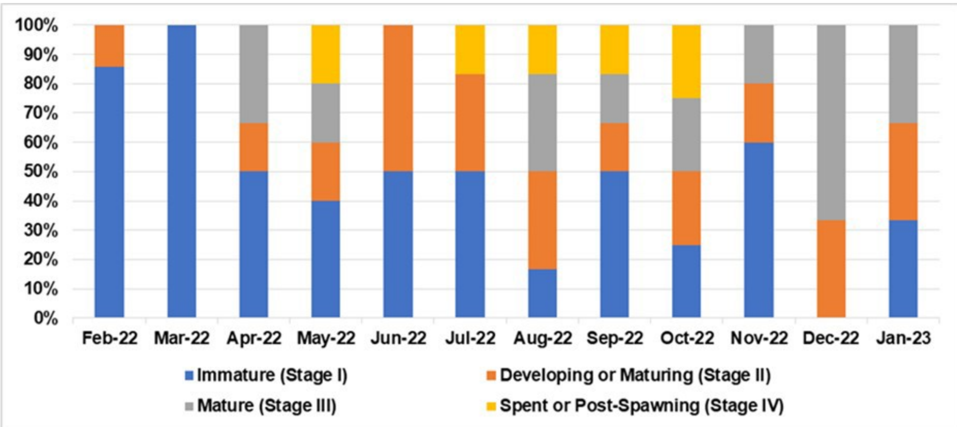

FIGURE 7 Monthly distribution of ovarian maturity stages in female *Aluterus scriptus*.

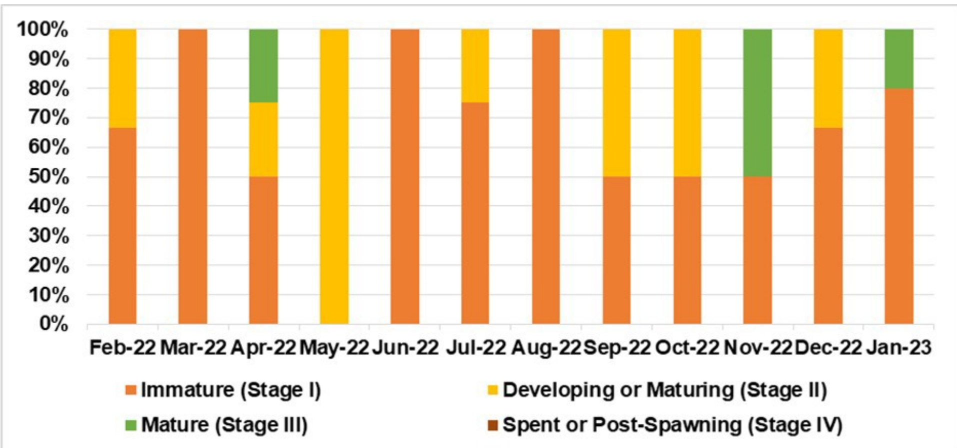

FIGURE 8 Monthly distribution of testes maturity stages in male *Aluterus scriptus*.

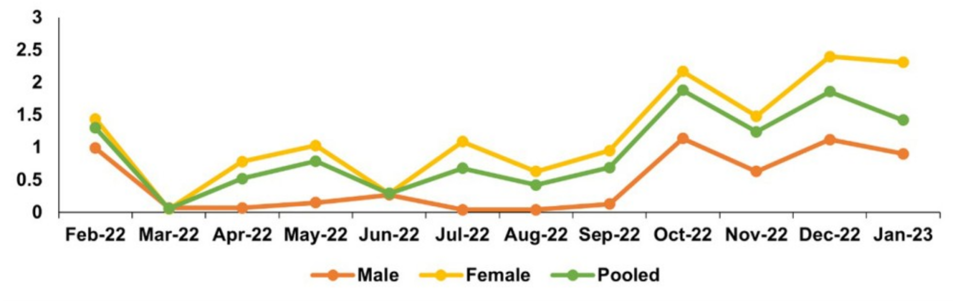

FIGURE 9 Gonadosomatic Index (GSI) of male, female, and pooled *Aluterus scriptus* indicating variations in reproductive development.

TABLE 2 Month-wise sex ratio of *Aluterus scriptus*.

Months	Male	%	Female	%	Total	Sex ratio (M:F)	Chi-square	Significance at 5% level*
Feb-22	28	30	65	70	93	1:2.3	1.6	NS
Mar-22	19	40	28	60	47	1:1.5	0.2	NS
Apr-22	38	40	56	60	94	1:1.5	0.4	NS
May-22	19	28.57	47	71.43	66	1:2.5	1.29	NS
Jun-22	9	20	38	80	47	1:4	1.8	NS
Jul-22	38	40	56	60	94	1:1.5	0.4	NS
Aug-22	47	45.45	56	54.55	103	1:1.2	0.09	NS
Sep-22	38	40	56	60	94	1:1.5	0.4	NS
Oct-22	19	33.33	38	66.67	57	1:2	0.67	NS
Nov-22	28	37.5	47	62.5	75	1:1.7	0.5	NS
Dec-22	28	50	28	50	56	1:1	0	NS
Jan-23	45	62.5	27	37.5	72	1:0.6	0.5	NS
Total	356	39.56	544	60.44	900	1:1.5	4.17	S (p=0.040)

*NS – non significance and S – Significant (p<0.05)

Fecundity showed a strong positive correlation with body length (Pearson's r = 0.986, p < 0.001), indicating that reproductive output increases markedly with increasing fish size. Absolute fecundity increased with increasing body size (Table 3). The highest mean absolute fecundity was recorded in the 65 cm length group (1451144±37704 eggs), while the lowest was observed in the 58 cm group (348519±13196 eggs). Similar to absolute fecundity, a positive allometric relationship between fecundity and both length and weight was evident. Relative fecundity based on body weight ranged from 267.28±2.02 to 856.76±5.33 eggs g^{-1}, while relative fecundity based on total length ranged from 6008.95±227.52 to 22325.29±280.07 eggs cm^{-1}.

TABLE 3 Estimated absolute and relative fecundity of *Aluterus scriptus*.

Mean length (cm)	Mean weight (g)	Absolute fecundity (No. of eggs)	Relative fecundity with weight (g)	Relative fecundity with total length (cm)
65	1683	1451144 ± 37704.76	835.43 ± 20.26	22325.29 ± 280.07
64	1557	1402572 ± 11311.43	856.76 ± 5.33	21915.18 ± 176.74
63	1542	1174641± 64098.1	741.93 ± 17.04	18645.1 ± 1017.43
62	1498	1072102 ± 35819.52	715.97 ± 15.55	17291.97 ± 577.73
61	1454	938235.1 ± 33934.29	645.27 ± 23.33	15380.9 ± 556.29
60	1447	621156.6 ± 228113.8	442.52 ± 152.47	10352.61 ± 3801.89
59	1388	386101.2 ± 16967.14	282.65 ± 12.21	6544.08 ± 287.57
58	1384	348519.3 ± 13196.67	267.28 ± 2.02	6008.95 ± 227.52

4 | DISCUSSION

4.1 Feeding ecology

Seasonal variation in feeding intensity observed in *A. scriptus* is consistent with patterns documented in tropical reef fishes, where fluctuations in stomach fullness are associated with prey availability, reproductive investment, and environmental seasonality (Hyslop 1980; Wootton 2012). The omnivorous feeding strategy recorded in the present study aligns with the trophic flexibility described for many reef-associated teleosts. Omnivory is increasingly recognized as a stabilizing feature in coral reef food webs (Choat *et al*. 2002; Brandl *et al*. 2019). The dominance of coral-associated material suggests strong ecological coupling with reef substrata. Reef structural complexity has been shown to directly influence trophic pathways and prey accessibility in coral reef fishes (Wilson *et al*. 2010; Graham and Nash 2013). The trophic level estimate (~2.79) positions *A. scriptus* within the lower–intermediate trophic spectrum. Comparable trophic levels have been reported for omnivorous reef fishes in global reconstructions of marine food webs (Pauly *et al*. 1998; Froese & Pauly 2026).

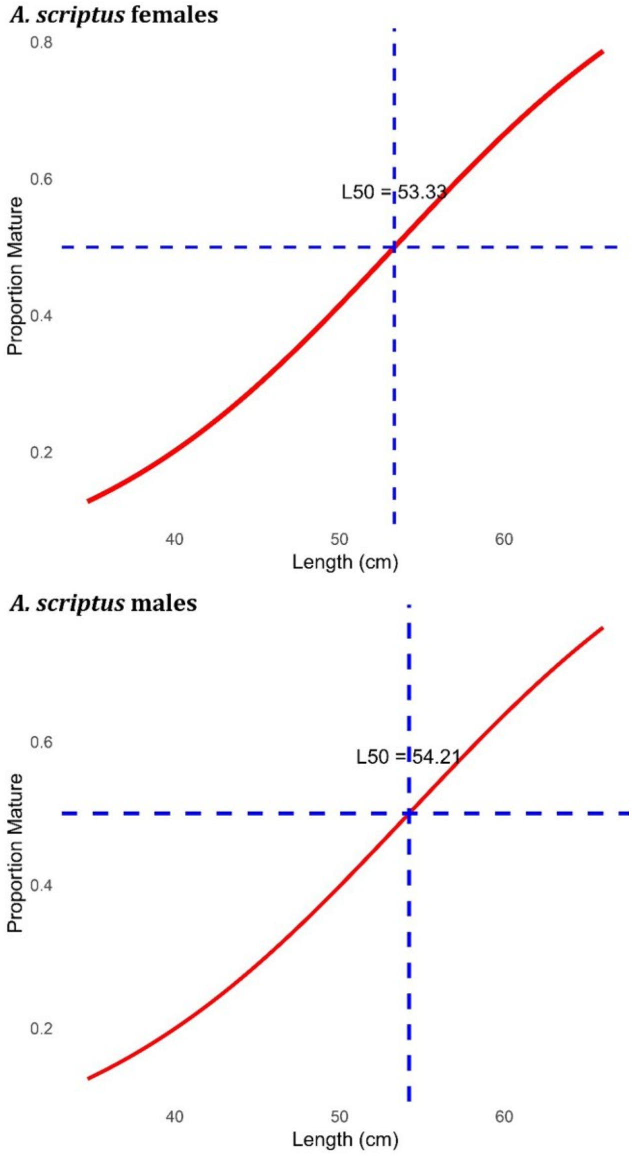

FIGURE 10 Length at first maturity (L_{50}) of *Aluterus scriptus* estimated from the logistic relationship between fish length and proportion of mature individuals for females and males.

4.2 Reproductive biology

The overall female-biased sex ratio (1:1.5) deviates from theoretical parity expectations (Fisher 1930) but is not uncommon in marine teleost populations. Female-biased sex ratios have been reported in several monacanthid species, such as *Stephanolepis hispidus*, where females dominate larger size classes (M:F ≈ 1:1.4), likely reflecting differential growth and survival patterns (Mancera-Rodríguez and Castro-Hernández 2015). However, variability in sex ratio is common within the family, with some species (e.g., *Thamnaconus modestus*, *Stephanolepis diaspros*) exhibiting near parity (El-Ganainy and Sabrah 2013) or even male dominance (Kim *et al.* 2026) depending on size structure and population dynamics. The extended spawning period observed for *A. scriptus* in this study is consistent with reproductive strategies reported in monacanthids, which often display seasonal or prolonged spawning periods linked to environmental conditions and resource availability. Sex ratio deviations may also arise from differential growth, mortality or spatial segregation (Nikolsky 1963; Wootton 2012). Recent syntheses suggest that demographic and ecological drivers, including fishing pressure, can influence sex structure in exploited fish populations (Hixon *et al*. 2014; Heino *et al*. 2015). The presence of mature individuals throughout the year, with a distinct reproductive peak from October to January, is characteristic of tropical reef fishes that exhibit prolonged spawning seasons (Johannes 1978; Sadovy and Domeier 2005). Extended spawning windows are adaptive in relatively stable thermal regimes and enhance recruitment success through temporal spreading of larval release (Lowerre-Barbieri *et al*. 2011). Seasonal GSI peaks observed in females during post-monsoon months are consistent with reproductive cycles described for tropical marine fishes in the Indian Ocean region (Grandcourt *et al*. 2009). GSI remains a robust indicator of reproductive timing when interpreted alongside maturity staging (West 1990; Brown-Peterson *et al*. 2011).

The relatively large size at first maturity (~53–54 cm) observed in *A. scriptus* suggests delayed reproductive investment and is comparable to values reported for other medium-sized reef fishes, suggesting a life-history strategy characterized by delayed maturation and higher reproductive output (Stearns 1998; Beverton and Holt 2012). Similar positive relationships between body size and fecundity have been widely documented in reef fishes, reinforcing the importance of conserving larger individuals within exploited populations (Berkeley *et al*. 2004; Hixon *et al*. 2014; Barneche *et al*. 2018). Delayed maturation has important fisheries implications, particularly if individuals are harvested before spawning (Froese 2004; Hixon *et al*. 2014). Larger females contribute significantly more eggs and potentially higher-quality offspring, reinforcing the ecological importance of preserving large spawners. Fecundity estimates in this study fall within ranges documented for tropical marine teleosts with batch spawning strategies (Murua and Saborido-Rey 2003; Lowerre-Barbieri *et al*. 2011). The observed size-dependent fecundity highlights the need for management strategies such as minimum size limits or slot limits to maintain spawning biomass and ensure sustainable exploitation (Prince and Hordyk 2019).

5 | CONCLUSIONS

This study provides fundamental knowledge on the biology, reproductive dynamics, feeding ecology, and growth patterns of *A. scriptus*, thereby contributing to a broader understanding of its ecological role and management needs. Seasonal variation in feeding intensity and dietary composition suggests that *A. scriptus* employs flexible feeding strategies to adapt to fluctuations in resource availability. The dominance of corals in its diet underscores its trophic dependence on reef ecosystems and highlights its ecological significance within these habitats. Reproductive assessments revealed a female-biased sex ratio (1:1.5) and extended spawning season, with peak reproductive activity during later part of the year. *Aluterus scriptus* is a highly fecund species, exhibiting substantial reproductive output that contributes to its resilience in dynamic marine environments. Despite its reproductive potential and ecological adaptability, the species exhibits seasonal patterns in landing, with peak occurrences typically occurring during the summer season. The inconsistency in landings highlights the need for effective management strategies, including seasonal harvest regulations and monitoring of reproductive cycles, to ensure the sustainable exploitation and long-term conservation of the species.

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ETHICAL APPROVAL

All applicable international, national and/or institutional guidelines for the care and use of animals were followed in this study.

CONFLICT OF INTEREST

The author declares no conflict of interest.

AUTHORS' CONTRIBUTION

Rajarajan Tamilselvan: Collected samples from fish landing centers, identified species, conducted laboratory observations, and authored the initial draft of the manuscript. Paulraj Jawahar: Conceptualized the research theme and idea, reviewed the manuscript drafts, and approved the final version. Natarajan Jayakumar, Rajagopal Santhakumar, Velu Rani: Supervision, writing review and editing, validation. Thirumal Iyyappan, Esakkimuthu Dineshkumar, Soosaiantony Emiema: Writing review, formal analysis and Data analysis.

DATA AVAILABILITY STATEMENT

The data supporting the findings of this study are available within the article.

REFERENCES

Appeldoorn RS (2018) Connectivity is everything. Gulf and Caribbean Research 29(1): 2–19.

Bagenal TB (1978) Methods for assessment of fish production in freshwaters. IBP Handbook No. 3, Blackwell Scientific Publication, 3rd Edition, London. 300 pp.

Barneche DR, Robertson DR, White CR, Marshall DJ (2018) Fish reproductive-energy output increases disproportionately with body size. Science 360(6389): 642–645.

Bellwood DR, Hughes TP, Folke C, Nyström M (2004) Confronting the coral reef crisis. Nature 429(6994): 827–833.

Berkeley SA, Chapman C, Sogard SM (2004) Maternal age as a determinant of larval growth and survival in a marine fish, *Sebastes melanops*. Ecology 85(5): 1258–1264.

Beverton RJ, Holt SJ (2012) On the dynamics of exploited fish populations, volume 11. Springer Science & Business Media.

Brandl SJ, Goatley CHR, Bellwood DR, Tornabene L (2018) The hidden half: ecology and evolution of cryptobenthic fishes on coral reefs. Biological Reviews 93(4): 1846–1873.

Brodeur RD, Smith BE, McBride RS, Heintz R, Farley E (2017) New perspectives on the feeding ecology and trophic dynamics of fishes. Environmental Biology of Fishes 100(4): 293–297.

Brown-Peterson NJ, Wyanski DM, Saborido-Rey F, Macewicz BJ, Lowerre-Barbieri SK (2011) A standardized terminology for describing reproductive development in fishes. Marine and Coastal Fisheries 3(1): 52–70.

Choat JH, Clements KD, Robbins AW (2002) The trophic status of herbivorous fishes on coral reefs - I: dietary analyses. Marine Biology 140(3): 613–623.

Dawson IK, Attwood SJ, Park SE, Jamnadass R, Powell W, ... Graudal L (2019) Contributions of biodiversity to the sustainable intensification of food production–thematic study for the state of the World's Biodiversity for food and agriculture. FAO, Rome. 38 pp.

Desai VR (1970) Studies on the fishery and biology of *Tor tor* (Hamilton) from river Narmada. Journal of the Inland Fisheries Society of India 2(5): 101–112.

El-Ganainy A, Sabrah M (2013) Biological studies on the filefish *Setphanolepis diaspros*, Fraser-Brunner, 1940 (Monacanthidae) from the Gulf of Suez, Egypt. Egyptian Journal of Aquatic Biology and Fisheries 17(1):

113–121.

Fermon Y, Bailly N, Cardiec F, Causse R, Emmanuel C, ... van der Zee J (2022) An annotated checklist of the fishes of Gabon. Cybium: An International Journal of Ichthyology 46(2–3): 69–317.

Ferreira CEL, Floeter SR, Gasparini JL, Ferreira BP, Joyeux JC (2004) Trophic structure patterns of Brazilian reef fishes: a latitudinal comparison. Journal of Biogeography 31(7): 1093–1106.

Fisher RA (1930) The genetical theory of natural selection. Clarendon Press, Oxford.

Froese R (2004) Keep it simple: three indicators to deal with overfishing. Fish and Fisheries 5(1): 86–91.

Froese R, Pauly D (2026) FishBase. World Wide Web electronic publication. www.fishbase.org, version (02/2026).

Graham NA, Nash KL (2013) The importance of structural complexity in coral reef ecosystems. Coral Reefs 32(2): 315–326.

Grandcourt EM, Al Abdessalaam TZ, Francis F, Al Shamsi AT, Hartmann SA (2009) Reproductive biology and implications for management of the orange-spotted grouper *Epinephelus coioides* in the southern Arabian Gulf. Journal of Fish Biology 74(4): 820–841.

Heino M, Díaz Pauli B, Dieckmann U (2015) Fisheries-induced evolution. Annual Review of Ecology, Evolution, and Systematics 46(1): 461–480.

Hixon MA, Johnson DW, Sogard SM (2014) BOFFFFs: on the importance of conserving old-growth age structure in fishery populations. ICES Journal of Marine Science 71(8): 2171–2185.

Hughes TP, Kerry JT, Álvarez-Noriega M, Álvarez-Romero JG, Anderson KD, ... Wilson SK (2017) Global warming and recurrent mass bleaching of corals. Nature 543(7645): 373–377.

Hyslop EJ (1980) Stomach contents analysis – a review of methods and their application. Journal of Fish Biology 17(4): 411–429.

Johannes RE (1978) Reproductive strategies of coastal marine fishes in the tropics. Environmental Biology of Fishes 3(1): 65–84.

Kim A, Bae H, Kim HG, Oh CW (2016) Age and growth of filefish, *Thamnaconus modestus* (Günther, 1877) off the Jeju Island of Korea. Ocean Science Journal 51(3): 355–362.

King JR, McFarlane GA (2003) Marine fish life history strategies: applications to fishery management. Fisheries Management and Ecology 10(4): 249–264.

Livingston RJ (1982) Trophic organization of fishes in a coastal seagrass system. Marine Ecology Progress Series 7(1): 1–12.

Lowerre-Barbieri SK, Brown-Peterson NJ, Murua H, Tomkiewicz J, Wyanski DM, Saborido-Rey F (2011) Emerging issues and methodological advances in fisheries reproductive biology. Marine and Coastal Fisheries 3(1): 32–51.

Mancera-Rodríguez NJ, Castro-Hernández JJ (2015) Reproductive biology of the planehead filefish *Stephanolepis hispidus* (Pisces: Monacanthidae), in the Canary Islands area. Ichthyological Research 62(3): 258–267.

Marshall DJ, Heppell SS, Munch SB, Warner RR (2010) The relationship between maternal phenotype and offspring quality: do older mothers really produce the best offspring? Ecology 91(10): 2862–2873.

Milessi AC, Arancibia H, Neira S, Defeo O (2005) The mean trophic level of Uruguayan landings during the period 1990–2001. Fisheries Research 74(1–3): 223–231.

Morgan MJ (2008) Integrating reproductive biology into scientific advice for fisheries management. Journal of Northwest Atlantic Fishery Science 41: 37–51.

Murua H, Saborido-Rey F (2003) Female reproductive strategies of marine fish species of the North Atlantic. Journal of Northwest Atlantic Fishery Science 33: 23–31.

Nikolsky GV (1963) The Ecology of Fishes. 6th Edition, Academic Press, London. 352 pp.

Pauly D, Christensen V, Dalsgaard J, Froese R, Torres Jr F (1998) Fishing down marine food webs. Science 279(5352): 860–863.

Pillay TVR (1952) Studies on the food and feeding habits and alimentary tract of the grey mullet, Mugil tade Forskal. Proceedings of the National Institute of Sciences of India 19: 777–827.

Pratchett MS, Wilson SK, Baird AH (2006) Declines in the abundance of *Chaetodon* butterflyfishes following extensive coral depletion. Journal of Fish Biology 69(5): 1269–1280.

Prince J, Hordyk A (2019) What to do when you have almost nothing: a simple quantitative prescription for managing extremely data-poor fisheries. Fish and Fisheries 20(2): 224–238.

Robertson DR, Petersen CW, Brawn JD (1990) Lunar reproductive cycles of benthic-brooding reef fishes: reflections of larval biology or adult biology? Ecological Monographs 60(3): 311–329.

Roff DA (1983) An allocation model of growth and reproduction in fish. Canadian Journal of Fisheries and Aquatic Sciences 40(9): 1395–1404.

Sadovy Y, Domeier M (2005) Are aggregation-fisheries sustainable? Reef fish fisheries as a case study. Coral Reefs 24(2): 254–262.

Schiettekatte N (2021) Fish-mediated functions on coral reefs (Doctoral dissertation, Université Paris sciences et lettres).

Seong GC, Chung S, Kim DG, Kang DY, Jin S, Baeck GW (2023) Feeding ecology of Antarctic toothfish, *Dissostichus mawsoni* in the subarea 88.3 (Bellingshausen Sea and eastern Amundsen Sea) of the Southern Ocean. Frontiers in Marine Science 10: 1240569.

Snedecor GW, Cochran WG (1980) Statistical Methods. 7th edition, Iowa State University Press, Ames.

Stearns SC (1998) The evolution of life histories. Oxford University Press, Oxford.

Thresher RE (1984) Reproduction in reef fishes. TFH Publications, Neptune City, New Jersey. 399 pp.

Udupay KS (1986) Reproductive biology of marine fishes. Fishbyte 4(2): 8–10.

Varghese TJ (1980) Fecundity of *Coilia dussumieri* valenciennes. Proceedings of the Indian National Science Academy 45(1): 114–119.

Venturelli PA, Murphy CA, Shuter BJ, Johnston TA, van Coeverden de Groot PJ, ... Leggett WC (2010) Maternal influences on population dynamics: evidence from an exploited freshwater fish. Ecology 91(7): 2003–2012.

West G (1990) Methods of assessing ovarian development in fishes: a review. Australian Journal of Marine and Freshwater Research 41(2): 199–222.

Wilson SK, Graham NAJ, Polunin NV (2007) Appraisal of visual assessment of habitat complexity and benthic composition on coral reefs. Marine Biology 151(3): 1069–1076.

Wootton RJ (2012) Ecology of teleost fishes (Vol. 1). Springer Science & Business Media.

R Tamilselvan http://orcid.org/0009-0001-3605-8007
P Jawahar http://orcid.org/0000-0002-0363-7483
T Iyyappan http://orcid.org/0000-0002-7826-8678
E Dineshkumar http://orcid.org/0009-0001-3605-8007
S Emiema http://orcid.org/0009-0002-9677-8468