



Length Weight Relationship and Condition Factor of Bengal Silver Pomfret in Mon Coastal Area, Myanmar

Zarni Ko Ko^{1*}

¹Department of Marine Science, Patheingyi University, Ayeyarwady Region, Myanmar

INFORMATION

Article history

Received 12 December 2023

Revised 14 March 2024

Accepted 15 March 2024

Keywords

Length frequency distribution

Length weight relationship

Condition factor

Pampus griseus

Mon coastal area

Contact

*Zarni Ko Ko

zni1446@gmail.com

ABSTRACT

The study on length weight relationship and condition factor of Bengal silver pomfret, *Pampus griseus* was conducted from 2018 to 2023 in Mon coastal area. A total of 5656 specimens of *P. argenteus* were collected, their lengths ranged from 8 to 36 cm and their weights ranged from 11.5 to 872.5 g. The fork length weight relationship was obtained as $W = 0.0805L^{2.6589}$ which was noticed in the negative allometric growth condition ($b < 3$) in the present study area. The present findings indicated that the correlation coefficient 'r' exhibits strong positive correlation between fork length and body weight with the correlation coefficient 'r' approaching almost towards +1. Moreover, the monthly condition factor of fish fluctuated between 1.41 and 4.73, indicating the good condition (health) of species in the present study.

1. Introduction

Pomfrets are excellent table fish, much relished and highly priced supporting a lucrative and commercially important fishery all along the coast of India but caught in greater abundance in Gujarat and Maharashtra on the west coast, and West Bengal and Orissa on the east coast. They are one of the most important marine fishes of India earning a good foreign exchange. The pomfret fishery in India is primarily comprised of three species, the silver pomfret, *Pampus argenteus* (Euphrasen, 1788); the Chinese pomfret, *Pampus chinensis* (Euphrasen, 1788) under family Stromateidae and the black or brown pomfret, *Parastromateus niger* (Bloch, 1795) under family Carangidae (Kumari and Dharmaraja, 1981; Sivakami et al., 2003) with a trophic level of 3.1, 3.6 and 3.0, respectively.

The other pomfret species which contribute to the world pomfret fishery include the Korean pomfret, *Pampus echinogaster* (Basilewsky, 1855), the Atlantic pomfret, *Brama brama* and the Pacific pomfret, *Brama japonica* (Devi, 2006).

Pampus, pomfret is extensively distributed in many regions of Japan, Indo-West Pacific, Southwest and west of Korea and China Eastern. Silver pomfret is well known from commercial point of view and it is chief fish utilized in the vicinity of North Persian Gulf even its stockpile is borrowed by the countries of Iraq, Kuwait and Iran Exterior morphological dimension is major investigation approach utilized until now in the fields of aquaculture and ichthyology frequently owing to simplicity and practice of its application. In several situations, it seems to be adequate and match to the aim of requirement. For comparison of variety of fish species, mostly biometrical characters are applied as well as for defining unevenness among the species between distinct breeds, population or line ages (Devi, 2006).

The length-weight relationship of fish is an important fishery management tool. Its importance is pronounced in estimating the average weight at a given length group and in assessing the relative well-being of a fish population. The length-weight relationship (LWR) is a very important



parameter to understand the growth dynamics of the fish population. Length and weight data are useful standard results of any fish sampling program. LWR of fishes are important in fisheries biology because they allow the estimation of the average weight of fish of a given length group by establishing a mathematical relation between the two parameters. The LWR is particularly important in parameterizing yield equations and in estimations of stock size. The exact relationship between length and weight differs among species of fish according to their inherited body shape, and within a species according to the condition (robustness) of individual fish. The study of morphometric characters in fishes is important because they can be used for the differentiation of taxonomic units. In fisheries science, the condition factor is used in order to compare the “condition”, “fatness” or wellbeing of fish. The condition factor usually increases with sexual maturation (Dutta et al, 2012).



Fig. 1. Map showing the present study landing centers in Mon coastal area

The systematics of the genus *Pampus* is complicated due to the morphological characters between species. The previous studies (Hlaing, 2010; Zaw, 2014) identified it as *P. argenteus* in Mon coastal waters. Cui et al. (2010) stated that the species from Bay of Bengal, including Myanmar coastal waters, was *P. cinereus* subsequently Divya et al. (2019) reported that the genus *Pampus* from Bay of Bengal (Arabian Sea and India) was not *P. argenteus* and proposed two cryptic species, species 1 and species 2. Based on further genetic investigations species 1 was identified as *P. cinereus*. Furthermore, Roul et al. (2021) also reported that genus *Pampus* has a very complex taxonomy and proposed that cryptic species 2 is *P. griseus*.

These species are of highly commercial importance in the Bay of Bengal including Myanmar.

In the present study, after careful morphological examination of fresh specimens from landing sites, *P. argenteus* (Euphrasen, 1788) of previous authors was re-described as *P. griseus* (Cuvier and Valenciennes, 1833).

There are several studies on the length weight relationship and condition factor of the pomfret in different regions. Moreover, the previous literatures were from western parts of the Indian Ocean but the literatures from eastern part of the Indian Ocean were scant. However, the previous research, Aung (2010), reported the fishery status of silver pomfret (*P. argenteus*) from Mon fish landing centers. Therefore, this finding of the species was the species (*P. griseus*).

The three most recent fishing surveys were carried out in the Mon State and Tanintharyi area between 2013 and 2018. There was no record of the pomfret in these surveys. However, the small number of “*Pampus argenteus*” recorded from Rakhine State. This total lack of information on the local pomfret is not helping in the management of natural resources of the State. Therefore, the objective of the present study is to estimate the length weight relationship and condition factor of Bengal silver pomfret, *Pampus griseus* in Mon coastal area.

2. Materials and Methods

2.1. Study Areas

The samples of Bengal silver pomfret, *Pampus griseus*, were collected from Kyaikkhami fish landing centre (16°05'N and 97°34'E) and Asin fish landing centre (15°13'N and 97°47'E) of Mon coastal area during the period from June 2018 to March 2023, with the exception of June 2019– August 2019 and April 2022– June 2022, where no samples were taken due to the closing season of fishing in Myanmar coastal area under the regulation of Department of Fisheries. The selected landing areas were the most available areas for the collection of the Bengal silver pomfret, *P. griseus* because these areas were the main landing centres in Mon coastal area. The locations of fish landing centres were shown in Fig. 1.

2.2. Estimation of Length Frequency Distribution and Length Weight Relationship

A total of 5656 fish samples were collected from fish landing centers from June 2018 to March 2023. The fork length (FL) of each individual fish was measured in centimeters from the tip of the snout to the bifurcation of the caudal fin using the measuring board, and weight was measured in grams (g) by using the digital balance. The monthly length frequency data were pooled into groups of 2 cm length intervals by using Microsoft Excel.

The length weight relationship was determined by the methods of least square using the formula, which was followed after Pauly (1984) as;

$$W = a L^b \text{ (Pauly, 1984)} \quad (1)$$

where, W= weight of fish (g), L= total length (TL) of fish in (cm), a= constant (intercept), b= length exponent (slope).

2.3. Estimation of Condition Factor (K)

The mean weight and length of the experimental fish were used to estimate condition factor using the Equation 2.

$$K = W / L^3 \times 100 \text{ (Pauly, 1984)} \quad (2)$$

where, W= Weight in gram (g), L= Fork length of fish in centimeter (cm).

3. Results

3.1. Length Frequency Distribution of Bengal Silver Pomfret, *P. Griseus* from Mon Coastal Area

In the present study, fork length groups of Bengal silver pomfret, *P. griseus* ranging from the minimum length group 7.5 cm-9.5 cm FL (mid-length of 8.5 cm) to the maximum length group 35.5 cm- 37.5 cm FL (mid-length of 36.5cm) fishes were used to determine during the period from June 2018 to March 2023. The length group ranging from 15.5 cm to 17.5 cm (FL) fish was recorded with the highest number

(1238), followed by 11.5 cm to 13.5 cm, 13.5cm to 15.5 cm and 17.5 cm to 19.5 cm while the largest size group of 35.6 cm to 37.5 cm was found with the lowest number (6) during the present study. There is description in Table 1 and Fig. 2.

3.2. Length Weight Relationship of Bengal Silver Pomfret, *P. Griseus* from Mon Coastal Area

The log transformation of the linear regression of fork the length weight relationship of *P. griseus* and its corresponding exponential form were presented in Figs. 3 and 4.

The regression of the fork length weight relationship took the form of $\log W = 2.6547 \log FL - 1.0888$ ($R^2 = 0.8793$), corresponding to its exponential form of $W = 0.0815L^{2.6547}$. It was revealed from the present estimation that the exponent 'b' value for the length weight relationship form was different from 3, indicating the negative allometric growth pattern on the species with a strong correlation ($r = 0.9383$). There are some presented in the Table 2.

Table 1. Length frequency distribution of *P. griseus* from Mon coastal area

Class size (cm)	7.5-9.5	9.5-11.5	11.5-13.5	13.5-15.5	15.5-17.5	17.5-19.5	19.5-21.5	21.5-23.5	23.5-25.5	25.5-27.5	27.5-29.5	29.5-31.5	31.5-33.5	33.5-35.5	35.5-37.5
Frequency no	35	432	300	955	1238	918	476	429	484	199	70	85	15	14	6

Table 2. Summary of length weight relationship of *P. griseus* from Mon coastal area

Length type	Range of length (cm)	Range of weight (g)	b	a	Exponential/ Non-linear equation	Linear/ logarithmic equation	(r)
Fork length	8-36	11.5 - 872.5	2.6589	0.0805	$W=0.0805L^{2.6589}$	$\log W = 2.6589 \log FL - 1.0944$	0.9383

3.3. Mean Condition Factor of Bengal Silver Pomfret, *P. Griseus* from Mon Coastal Area

The mean condition factors (K) of *P. griseus*, estimated at between 1.41 and 4.73, were shown in Table 3 and Fig. 5. The monthly mean condition factor was maximum in the month of August (2018-2019) and had a minimum value in the month of June (2018-2019). In general, the mean K values followed a similar trend in 2019 – 2020 and 2022 – 2023, with gradual increases and decreases in values during the months of 2018 to 2019.

relationship and condition factor of Bengal silver pomfret, *P. griseus* in Mon coastal area from 2018 to 2023. Data collection was suspended during two closed seasons, namely June to August 2019 and April to June 2022. Field work was also disrupted during the Covid-19 pandemic. Data collection was resumed in July 2022 and completed in March 2023. The measurement of the length frequency and length weight relationship of fish were the basic factors used in the stock assessment. It has the great significance with regards to their morphology, biology, growth, and general well-being of fishes, and is in turn also helpful in fisheries management (Devi, 2006).

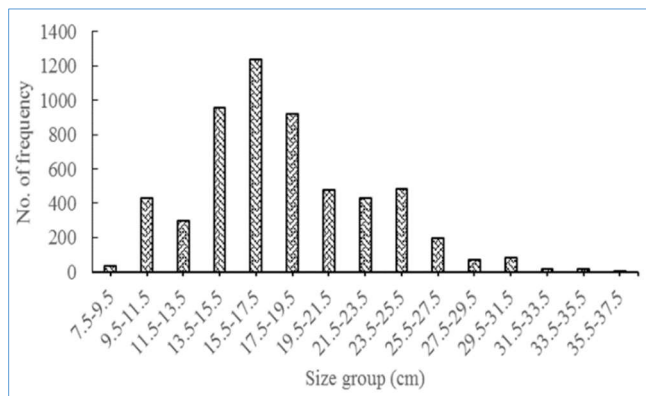


Fig. 2. Length frequency distribution of *P. griseus* from Mon coastal area

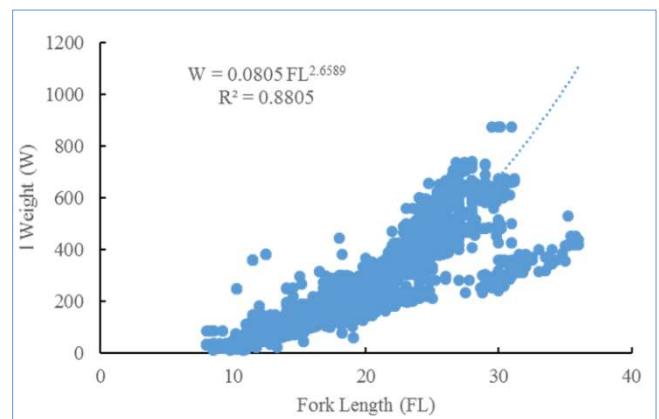


Fig. 3. Non-linear form of length weight relationship of *P. griseus* from Mon coastal area

4. Discussion

The present study was to investigate on the length weight

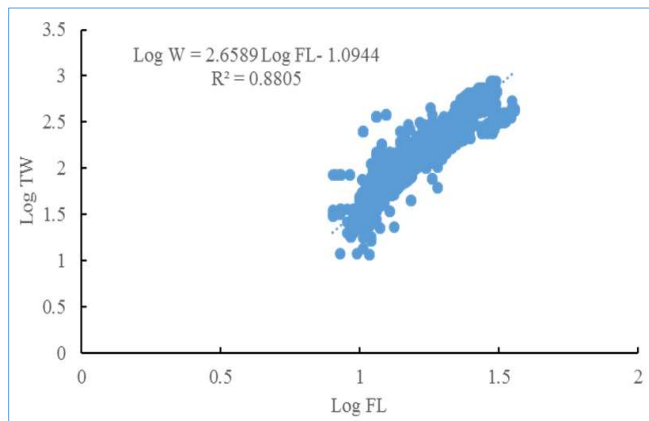


Fig. 4. Linear length weight relationship of *P. griseus* from Mon coastal area

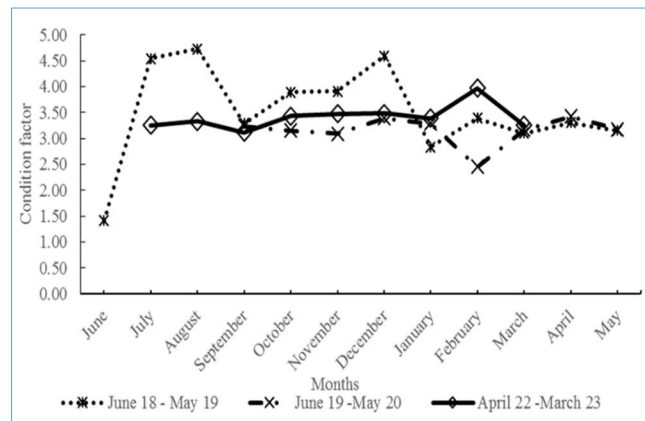


Fig. 5. Monthly mean condition factor of *P. griseus* from Mon coastal area

Table. 3. Monthly mean condition factor of *P. griseus* from Mon coastal area

Period	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
June 18 - May 19	1.41	4.54	4.73	3.29	3.89	3.91	4.59	2.84	3.39	3.10	3.31	3.15
June 19 -May 20	-	-	-	3.23	3.15	3.09	3.39	3.29	2.45	3.17	3.42	3.18
April 22 -February 23	-	3.25	3.33	3.12	3.44	3.47	3.49	3.39	3.97	3.25	-	-

The length size for *P. griseus* ranged from 8 to 36 cm in the present study area. The present finding of *P. griseus* was similar to the length range of pomfret species (*P. argenteus*) reported by other authors in the different regions, such as Ali et al. (2000) and Devi (2006) in West India; Abdul-Razak et al. (2008) in Arabian Gulf; Ghosh et al. (2009); Hashemi et al. (2012); Prihatiningsih et al. (2015), and Prihatiningsih et al. (2020) in Indonesian Waters; Parsa et al. (2017) in Persian Gulf and Oman Sea and Karim et al. (2018); Hikmawansyah, et al. (2019); Dutta et al. (2012) and Dutta et al. (2021) in India.

The exponential coefficient 'b' larger or smaller than 3.0 showed an allometric growth; value $b > 3$ showed a positive allometric growth, while value $b < 3$ indicates a negative allometric growth. It was isometric growth when value b was equal to 3.0 (cited in Ahmed et al., 2014). From the present estimation, the length weight relationship of *P. griseus* showed the negative allometric growth pattern of species because the value of b was 2.6589. However, Aung (2010) reported that the positive allometric growth with 'b' value of 3.362 respect to the equation of length weight relationship for *P. argenteus* (= *P. griseus*) was $W = 0.00369TL^{3.362}$ with a strong correlation from three landing centers of Mon coastal area.

Furthermore, the present study was similar to the previous findings for pomfret (*P. argenteus*) from the areas of the Bay of Bengal by Saifur Rahman et al. (2004), Abdurahiman et al. (2004), Karim et al. (2018) and Akhter et al. (2020), in Bangladesh Waters; Devi (2006) and Dutta et al. (2012) in West Indian Waters; Prihatiningsih et al. (2015) and Salim, et al. 2020 in Indonesian Waters; and Din et al. (2015) and Iqbal et al. (2015) in Pakistani Waters.

However, the findings for same pomfret (*P. argenteus*) by Dutta et al. (2021) in India, Mohamed and Ali (1993) and Abdul-Razak et al. (2008) in Arabian Gulf; Parsa et al. (2017)

in Persian Gulf and Oman Sea, and Siyal and Amir (2012) in Pakistani Waters found positive allometric growth in fish. Moreover, Ghosh et al. (2009) and Pati (1981) in India; Khan (2000) in Indonesian Waters; and Kazeni et al. (2013) in Persian Gulf and Oman Sea reported the isometric growth pattern in different localities.

Furthermore, Dadizie et al. (2000) also reported the positive and negative growth patterns for pomfret (*P. argenteus*) in Kuwaiti waters.

The calculated value of the correlation coefficient (r) indicated a high correlation between the length and weight and proved to be highly significant. If the value is found to be higher than 0.5, it shows that the length weight relationship is positively correlated, and vice versa. If the value of 'r' is high ($r < 0.5$), it indicates that the length increases with an increase in the weight of the fish. The value of $r > 0.8$ regardless of sex and season represents a strong relationship between length and weight and indicate whether the relationship is significant or not. It is indicated that if $r > 0.9$ and weight increases in length, then it is clear that the fish maintains its shape throughout its life (Jyrwa et al. 2015).

During the present study, the correlation coefficient between the length and weight of *P. griseus* was found to be 0.9383. Therefore, the length weight relationship of species showed a positive correlation and indicated that the weight of species increased with the increased in length.

The present mean condition factors (K) of *P. griseus* ranged between 1.41 and 4.73. The value of condition factor (K) was to be greater than 1 in all fish populations, which indicated good condition (healthy) in fish, as documented by Singh and Serajuddin (2017), Jyrwa et al. (2015) and Olurin and Aderibigbe (2006). The values of condition factors (K) of *P. griseus* in the present findings were to be more than 1 in all

months, which were comparable with the very best in the above-mentioned findings. Therefore, the population of *P. argenteus* confirmed the good condition of the fish.

5. Conclusion

This study provided basic information on length frequency distribution, length weight relationship and condition factor of Bengal silver pomfret from Mon coastal area. In present study, the adult fish species were more observed according to length frequency distribution. The relationship between fork length and weight of *P. griseus* observed negative allometric growth ($b < 3$), deviation the cubic law. The monthly mean condition factor (K) indicated the species exhibits healthy and robust condition showing good compatibility with environment as the mean K value greater than 1. This study can help to the fishery managers of the Mon coastal area, because of the lack of the documentation about length weight relationship of the selected species of the Mon coastal area.

Acknowledgements

I am indebted to U Min Htut and officers, Thanlwin Aye Co. Ltd., Ye Township, Mon State for providing useful information and for their constant assistance in field work. I also thank to my students, Department of Marine Science, Mawlamyine University for their help in field trips and advising and willing helpful to me. I also grateful to my pupils, final students, Department of Marine Science, Mawlamyine University for help in field trips and identified the fish specimens. Finally, my infinite thanks are to my family and my beloved brother for their kind and financial support throughout this study period.

References

- Abdul-Razak, M.M., Amjad, K.R., Amna, A.H., 2008. The Stock Assessment of Silver Pomfret *Pampus argenteus* (Euphrasen, 1788) in Iraqi Marine Waters during the period 2004-2005. *Basrah Journal of Agricultural Sciences* 21, 1-16.
- Abdurahiman, K.P., Harishnayak, T., Zacharia, P.U., Mohamed, K.S., 2004. Length-weight relationship of commercially important marine fishes and shell fishes of the southern coast of Karnataka, India. *NAGA, World Fish Centre Quarterly* 27 (1), 9-10.
- Ahmed, Q., Yousuf, F., Nazim, K., Khan, M.U., 2014. Length-weight relation in Three Marketable Sized Mackerel Fish Species collected from Karachi Fish Harbour, Pakistan. *FUUAST Journal of Biology* 4 (4), 107-111.
- Akhter, F., Islam, Md. A., Islam, Md. M., Zahangir, Md. M., 2020. Seasonal Variations in Some Biological Parameters (Length-Weight Relationship, Condition Factor, Hepatosomatic and Gonadosomatic Index) of Silver and Black Pomfret (*Pampus argenteus* and *Parastromateus niger*) from the Bay of Bengal. *Journal of Fisheries and Aquaculture Research* 5 (1), 43-53.
- Ali, T.S., Mohamed, A.R.M., Hussain, N.A., 2000. Growth, mortality and stock assessment of Silver Pomfret, *Pampus argenteus* in the Northwest Arabian Gulf, Iraq. *Marina Mesopotamica* 15 (2), 373-387.
- Aung, Z.Z., 2010. The fishery status of Pomfret (*Pampus argenteus*) in coastal areas of Mon State. Unpublished MSc Thesis, Department of Marine Science, Mawlamyine University, Myanmar.
- Cui, Z., Liu, Y., Liu, J., Luan, W., 2010. Molecular identification of *Pampus* fishes (Perciformes, Stromateidae). *Ichthyological Research* 57, 32-39.
- Cuvier, G., Valenciennes, M., 1833. *Histoire Naturelle des Poissons*, Vol. 9. Paris: Nabu Press.
- Dadzie, S., Abou-Seedo, F., Manyala, J.O., 2000. Length-weight relationship and condition factor of *Pampus argenteus* (Euphrasen, 1788) in Kuwaiti waters. *Kuwait Journal of Science & Engineering* 27 (1), 123-134.
- Devi, O.J., 2006. Studies on Population Dynamics of *Pampus argenteus* (Euphrasen) from Kakdwip Coastal Region of West Bengal, India. Unpublished M.F.Sc Thesis. Department of Fishery Biology and Resources Management, West Bengal University of Animal and Fishery Sciences, India.
- Din, N., Khawar, M., Masood, Z., Yasinzai, M.I., Nazeer, N., Zakir, M., Iqbal, F., Razaq, W., 2015. Length-Weight Relationship, Condition and Relative Condition Parameters of Silver Pomfret, *Pampus argenteus* Collected from Quetta City of Pakistan. *Global Veterinaria* 14 (6), 879-882.
- Divya, P.R., Kumar, R.G., Mohitha, C., Rajool Shani, C.P., Bineesh, K.K., Basheer, V.S., 2019. Resurrection and re-description of *Pampus candidus* (Cuvier), silver pomfret from the northern Indian Ocean. *Zoological Studies* 58, 1-10.
- Dutta, S., Maity, S., Chanda, A., Akhand, A., Hazra, S., 2012. Length Weight Relationship of Four Commercially Important Marine Fishes of Northern Bay of Bengal, West Bengal, India. *Journal of Applied Environmental and Biological Sciences* 2 (2), 52-58.
- Dutta, S., Orlov, A.M., Hazra, S., 2021. Population biology and exploitation status of four commercially important marine fishes of the northern Bay of Bengal, India. *Iranian Journal of Fisheries Sciences* 20 (1), 62-83.
- Euphrasen, B.A., 1788. Beskrifning på 3:ne fiskar. *Kongliga Vetenskaps-Academiens Handlingar*, Stockholm. 9: 51-55. Pl. 9.
- Ghosh, S., Mohanraj, G., Asokan, P.K., Dhokia, H.K., Zala, M. S., Bhint, H.M., 2009. Fishery and stock estimates of the silver pomfret, *Pampus argenteus* (Euphrasen), Landed by gill netters at Veraval. *Indian J. Fish.* 56 (3), 177-182.
- Hashemi, S.A.R., Safikhani, H., Vahabnezhad, A., 2012. Growth, Mortality and exploitation rate of Silver Pomfret (*Pampus argenteus* Euphrasen, 1788) in northwest of Persian Gulf (Khuzestan Coastal Water, Iran). *American-Eurasian Journal of Agricultural and Environmental Sciences* 12 (8), 1095-1101.
- Hikmawamsyah, Y., Andriani, Y., Khan, A.M.A., Dewanti, L.P., 2019. Stock Estimates of White Pomfret (*Pampus argenteus*) Based on Length and Weight Data in Pangandaran Waters. *Asian Journal of Fisheries and Aquatic Research* 5 (1-2), 1-13.
- Hlaing S.S., 2010. Commercially important Ichthyological fauna of the Thanlwin River Mouth and adjacent sea. Unpublished MRes Thesis, Department of Marine Science, Mawlamyine University, Myanmar.
- Iqbal, F., Masood, Z., Razaq, W., Rafique, N., Din, N., Zahid, H., Khan, F., Bano, N., 2015. Morphometric Characteristics of Silver Pomfret, *Pampus argenteus* of Family Stromateidea Collected from Fish Market of Quetta City of Pakistan. *Global Veterinaria* 15 (4), 394-396.
- Jyrwa, L., Bhuyan, R.N., Nath, R., 2015. Length-Weight relationship and condition factor of *Neolissochilus hexagonolepis* (McClelland) in Meghalaya, India: A comparative study. *International Journal of Fisheries and Aquatic Studies* 3 (1), 419-422.
- Karim, E., Liu, Q., Rahman, M.F., Khatun, M.H., Barman, P.P., Shamsuzzaman, M.M., Mahmud, Y., 2018. Comparative assessment of population biology of three popular pomfret species, *Pampus argenteus*, *Pampus chinensis* and *Parastromateus niger* in the Bay of Bengal, Bangladesh. *Iranian Journal of Fisheries Sciences* 19 (2), 793- 813.

- Kazemi, H., Paighambari, S.Y., Daliri, M., Naderi, R.A., 2003. Length-weight and length-length relationships, condition factors and optimal length of some fish species from the Persian Gulf and Oman Sea. *International Journal of Aquatic Biology* 1 (4), 167-174.
- Khan, M.Z. 2000. The fishery and resource characteristics of pomfrets. In: Pillai, V.N. and Menon, N. G. (Eds), *Marine Fisheries research and management*. Central Marine Fisheries Research Institute, Cochin, pp. 364-373.
- Mohamed, A.R., Ali, T.S., 1993. Growth, mortality and stock assessment of silver pomfret *Pampus argenteus* (Euphrasen) in the Northwest Arabian Gulf. *IPA Journal for Agricultural Research* 3 (1), 18-33.
- Olurin, K.B., Aderibigbe, O.A., 2006. Length-Weight Relationship and Condition Factor of Pond Reared Juvenile *Oreochromis niloticus*. *World Journal of Zoology* 1 (2), 82-85.
- Parsa, M., Khoshdareghi, M.M., Nekuro, A., Pouladi, M., 2017. Population dynamic parameters of Silver Pomfret *Pampus argenteus* in Iranian waters of the northern Persian Gulf and Oman Sea. *Biodiversitas* 18 (2), 633-638.
- Pati, S., 1981. Observations on the Length-weight relationship of pomfrets from the Bay of Bengal. *Mahasagar* 14 (1), 83-85.
- Pauly, D., 1984. *Fish Population Dynamics in Tropical Waters: A Manual for Use with Programmable Calculator*. International Center for Living Aquatic Resources Management, Manila, Philippines.
- Prihantingsih, L.P., Chodrijah, U., 2020. Reproductive biology, growth and mortality of silver pomfret (*Pampus argenteus*) in Tarakan waters, North Kalimantan. *International Conference on Fisheries and Marine* 158, 1- 9.
- Prihantingsih, M.N., Hartati, S.T., 2015. Population parameters of white pomfret (*Pampus argenteus*) in Tarakan Waters, East Kalimantan. *Bawal* 7 (3), 165-174.
- Roul, S.K., Jeena, N.S., Kumar, R., Vinothkumar, R., Rahangdale, S., Rahuman, S., Ghosh, S., Rohit, P., Gopalakrishnan, A., 2021. Postulating the Modality of Integrative Taxonomy in Describing the Cryptic Congener *Pampus griseus* (Cuvier) and Systematics of the Genus *Pampus* (Perciformes: Stromateidae). *Frontiers in Marine Science* 8, 1-22.
- Saifur R.M., Aminur R.A., Rafiqur R.R., Kamal, D., 2004. Length-weight Relationship, Condition factor and Harvesting Records of Silver Pomfret (*Pampus argenteus*) in the Southwestern Region of Bangladesh. *Pakistan Journal of Biological Sciences* 7 (4), 452-456.
- Salim, G., Handayani, K., Indarjo, A., Ransangan, J., Atieqah, N., 2020. Growth, Mortality and exploitation rate of *Pampus argenteus*, *Parastromateus niger* and *Scomberomorus commerson* in Sebatik Waters, Indonesia. *Biodiversitas* 21 (11), 5363-5372.
- Singh, M., Serajuddin, M., 2017. Length-weight, length-length relationship and condition factor of *Channa punctatus* collected from three different rivers of India. *Journal of Entomology and Zoology Studies* 5 (1), 191-197.
- Zaw, Z.Z., 2014. A study on fishery of some commercial fishes in Asin coastal areas, Ye Township, Mon State. Unpublished MRes Thesis, Department of Marine Science, Mawlamyine University. Myanmar.