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الهيئة الإقليمية للمحافظة على بيئة البحر الأحمر وخليج عدن

The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden,

Sustainable Fishery Development in Red Sea and Gulf of Aden (SFISH).
(Project Number P178143)

Regional Workshop on Improving Fishery Statistics and their use in Fish Stock Assessment and Management in the Red Sea and Gulf of Aden.

HQ PERSGA, Jeddah, 3-5 November 2025.

national report as contribution to the regional report on the stock assessment of fisheries in Red Sea and Gulf of Aden.

National consultant
D. Saif Ali Moqbel – Yemen

November 2025.

Introduction

- Yemen has a coastline of 2,500 kilometers along the Red Sea, the Gulf of Aden, and the Arabian Sea, providing fertile fishing grounds.
- Fisheries resources in Yemen represent an essential source of food and a significant contributor to the national economy.
- Marine catches experienced remarkable growth in the late twentieth century.
- Official statistics recorded 256,000 tons in 2004 (Impact Consulting/UNDP, 2019).
- Prior to the conflict that erupted in 2014, the Food and Agriculture Organization (FAO) estimated that fisheries contributed over 15% from the gross domestic product of Yemen's (GDP).
- In recent years, the sector has faced challenges extending beyond environmental fluctuations, including overfishing of certain species, piracy, conflicts limiting access to territorial waters.
- Informal reports note declines in fisheries catches (Al-Muwafaq, 2023).
- The war aside from weakened data problems—directly disrupted fishing operations and undermined the health of the fisheries sector.
- Fishers suffered severe livelihood impacts due to damaged gears and weak capabilities.

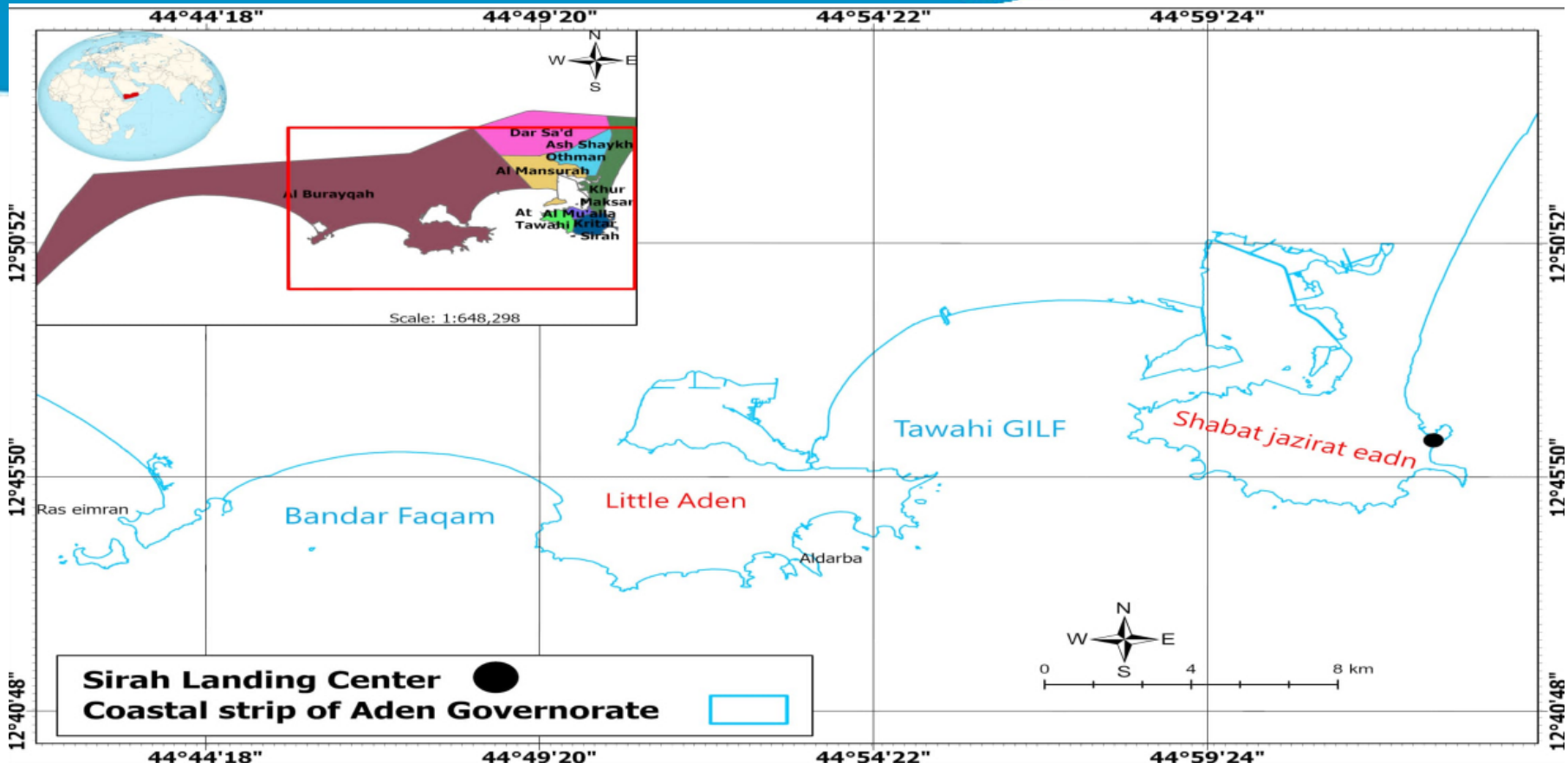

Fig (1): The map showing the location of landing center (Sirah) in Gulf of Aden - Yemen.

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Sirah landing center in Gulf of Aden - Yemen.

Table (1):List of target Species

Latin name	Common Name	Alternative species
PELAGIC FISH SPECIES		
Euthynnus affinis	Kawakawa, Mackerel tuna	
Scomberomorus commerson	Narrow-barred Spanish mackerel	
DEMERSAL FISH SPECIES		
Lethrinus mahsena	Sky emperor	*Lethrinus lentjan*
Epinephelus summana	Summan grouper	*Epinephelus chlorostigma*
Lutjanus bohar	Two-spot red snapper	
CRUSTACEANS		
Penaeus semisulcatus	Green tiger prawn	
Panulirus homarus	Scalloped spiny lobster	Not available in Site

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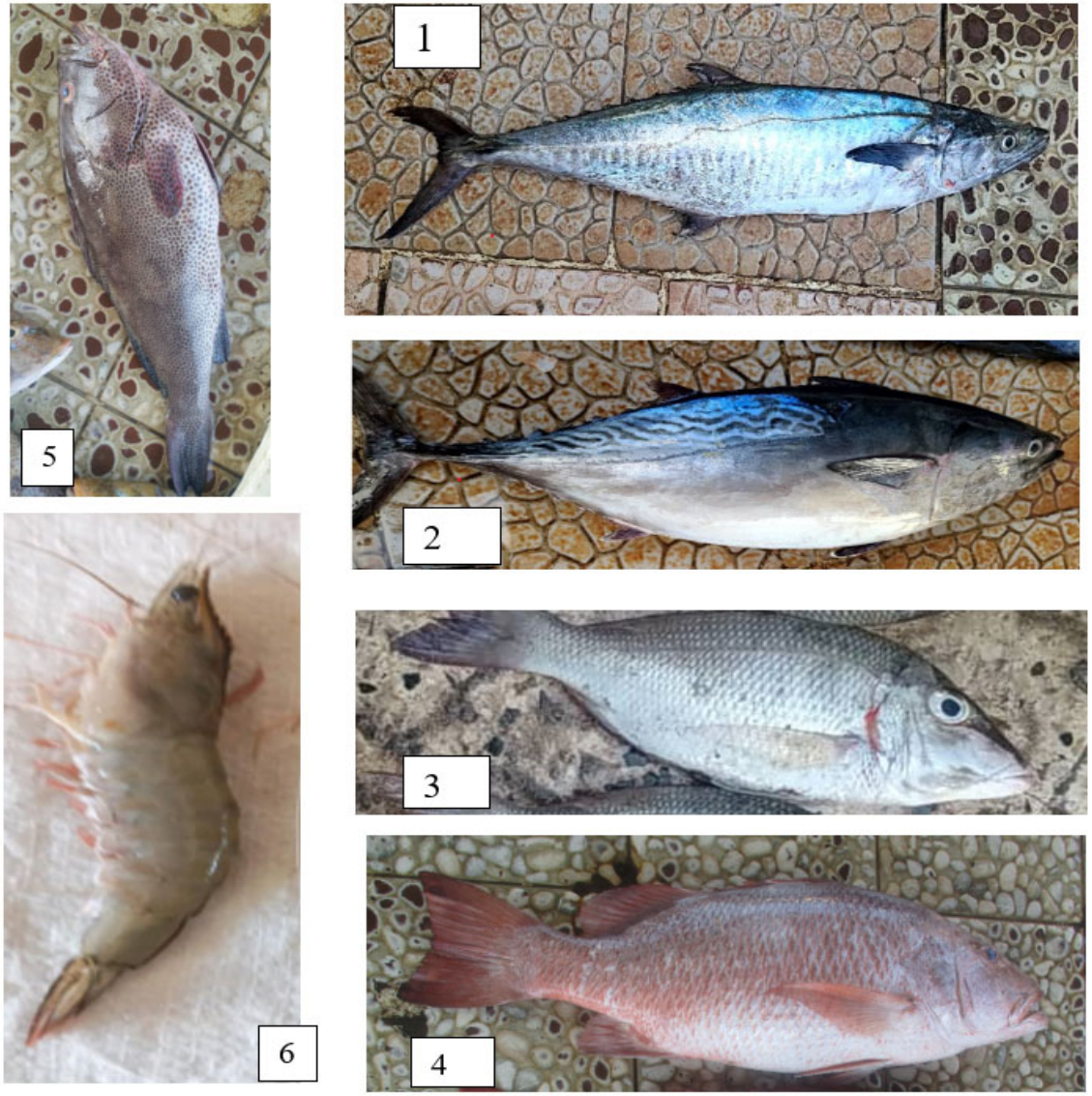

Fig.3. Photos of species target: 1- *S. commerson*, 2- *E. affinis*, 3- *L.lentjan*, 4- *L.bohar*, 5-*E. chlorostigma* , 6-*P.semisulcatus*.

Results

The collection of length frequency data and total catch weight for the selected species was started in August 2024 and continued monthly until July 2025. Review results for the **catch quantities**, distribution of **length frequencies** and **growth parameter** analysis was carried out using the FISAT II software ELEFAN I program as, Coefficient of growth rate k (year-1), total mortality rate *Z* (year-1), natural mortality M (year-1), fish mortality F (year-1), and is the Exploitation Rate E (year-1).

Table (1): Showing Fishing gear and catch quantities at the landing center Sirah – Gulf of Aden) – Yemen during August, September and October 2024.

Type of Boat	NO of boats	HP	Fish Gear				Total catch weight in Kg				Species
			Type of Net	Mesh size(cm)	Type of Hook	Hook size(cm)	August	September	October	Total	
Boat (11M)	22	40 - 60	Gillnet	7, 8	-	-	5105	8310	6220	19635	*S. commerson*
Boat (9M)	17	18 -40	Gillnet	4.5	-	-	3820	4540	3180	11540	*S. commerson*
Boat (11)M	20	40 - 60	Gillnet	7	-	-	3990	5170	6957	16117	*E. affinis*
Boat (9 M)	18	18 -40	Gillnet	4.5	-	-	2970	4040	4370	11380	*E. affinis*
Boat (11M)	21	40 - 60	Gillnet	7	-	-	4217	7060	6680	17957	*L. lentjan*
Boat (9M)	18	41 - 60	Gillnet	4.5		-	2870	5126	2950	10946	*L. lentjan*
Boat (9 M) + Hoori 7	20	18 -40	-	-	Handline	7	2195	3400	4850	10445	*L. bohar*
Houri (7M)	15	15- 18	-	-	Handline	6	1705	1970	2000	5675	*L. bohar*
Houri (3M)	34	8 - 15	Trawling	2.5 , 3	-	-	2600	2190	1060	5850	*P. semisulcatus*
Total catch weight (kg)							29472	41806	38267	109545	

Table (2): Showing Fishing gear and catch quantities at the landing center Sirah – Gulf of Aden) – Yemen during November, December 2024 and January 2025.

Type of Boat	NO of boats	HP	Fish Gear				Total catch weight in Kg				Species
			Type of Net	Mesh size(cm)	Type of Hook	Hook size(cm)	Nov.	Dec.	Jan.	Total	
Boat (11M)	23	40 - 60	Gillnet	8, 7	-	-	7670	7490	7510	22670	*S. commerson*
Boat (9M)	15	18 -40	Gillnet	4.5	-	-	5000	3270	2450	10720	*S. commerson*
Boat (11)M	22	40 - 60	Gillnet	7	-	-	5730	6580	5960	18270	*E. affinis*
Boat (9 M)	14	18 -40	Gillnet	4.5	-	-	2570	2540	2730	7840	*E. affinis*
Houri (7M)	14	15- 18	Gillnet	4.5	-	-	1840	3050	4510	9400	*L. lentjan*
Boat (9M)	18	41 - 60	-	-	Handline	6	5280	4930	3810	14020	*L. lentjan*
Boat (9 M)	19	18 -40	-	-	Handline	7	3350	4170	1530	9050	*L. bohar*
Houri (7M)	12	15- 18	-	-	Handline	6	1410	1170	730	3310	*L. bohar*
Houri (7M)	16	15- 18	-	-	Handline	6	134	158	2290	2582	*E. chlorostigma*
Houri (7M)	15	15- 18	-	-	Handline	4	93	101	880	1074	*E. chlorostigma*
Total catch weight (kg)							33077	33459	32400	98936	

Table (3): Showing Fishgear and catch quantities at the landing center Sirah – Gulf of Aden) – Yemen during February, March and April 2025.

Type of Boat	NO of boats	HP	Fish Gear				Total catch weight in Kg				Species
			Type of Net	Mesh size(cm)	Type of Hook	Hook size(cm)	Febr.	March	April	Total	
Boat (11M)	24	40 - 60	Gillnet	7, 8, 9	-	-	6900	6210	7020	20130	*S. commerson*
Boat (9M)	12	18 -40	Gillnet	4.5	-	-	1600	3150	2170	6920	*S. commerson*
Boat (11)M	17	40 - 60	Gillnet	7	-	-	4940	5660	5700	16300	*E. affinis*
Boat (9 M)	17	18 -40	Gillnet	4.5	-	-	3150	3430	3280	9860	*E. affinis*
Boat (11M)	17	40 - 60	Gillnet	4.5	-	-	3830	4610	4520	12960	*L. lentjan*
Boat (9M)	18	18 -40	-	-	Handline	6	2030	2500	3600	8130	*L. lentjan*
Boat (9 M)	16	18 -40	-	-	Handline	7	218	241	278	737	*L. bohar*
Houri (7M)	18	15-18	-	-	Handline	6	130	210	211	551	*L. bohar*
Boat (9M)	19	18 -40	-	-	Handline	6	4240	4650	3220	12110	*E. chlorostigma*
Houri (7M)	15	15- 18	-	-	Handline	4	1830	1500	2200	5530	*E. chlorostigma*
Total catch weight (kg)							28868	32161	32199	93228	

Table (4): Showing Fishgear and catch quantities at the landing center Sirah – Gulf of Aden) – Yemen during May - July 2025.

Type of Boat	NO of boats	HP	Fish Gear				Total catch weight in Kg				Species
			Type of Net	Mesh size(cm)	Type of Hook	Hook size(cm)	May	June	July	Total	
Boat (11M)	5	40 - 60	Gillnet	7, 9	-	-	584	-	-	584	*S. commerson*
Boat (9M)	7	18 -40	Gillnet	4.5	-	-	182	-	-	182	*S. commerson*
Houri (7 M)	24	-		-	Handline	4, 6	-	249	193	442	*S. commerson*
Boat (11)M	18	40 - 60	Gillnet	7	-	-	4900	1550	1180	7630	*E. affinis*
Boat (9 M)	18	18 -40	Gillnet	4.5	-	-	3230	930	840	5000	*E. affinis*
Boat (9M)	6	41 - 60	-	-	Handline	6	750	-	-	750	*L. lentjan*
Houri (7M)	30	15- 18	-		Handline	4, 6	410	1066	888	2364	*L. lentjan*
Houri (7M)	36	15- 18	-	-	Handline	6,7	629	417	445	1491	*L. bohar*
Houri (7M)	24	15- 18	-	-	Handline	4,6	3890	109	-	3999	*E. chlorostigma*
Total catch weight (kg)							14757	4321	3546	22442	

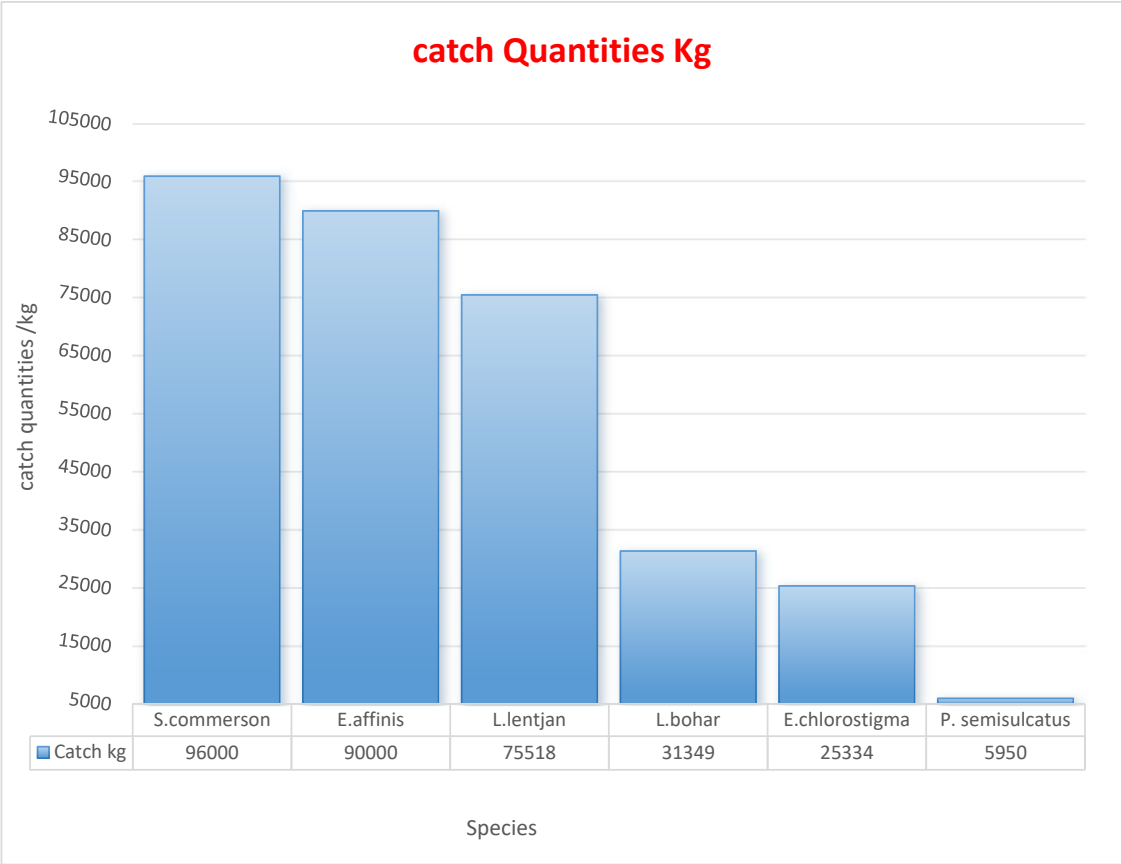

Fig : Catch quantities for target species from Sirah landing center – Aden
August 2024 – July 2025

species	Catch kg	catch Ton
S.commerson	96000	96
E.affinis	90000	90
L.lentjan	75518	75.5
L.bohar	31349	31.3
E.chlorostigma	25334	25.3
P. semisulcatus	5950	6
Total	324,151	324


1: 70.8 cm
3: 65.0 cm
5: 1.8 cm
2: 61.8
6: 9.8 cm
4: 28.6 cm







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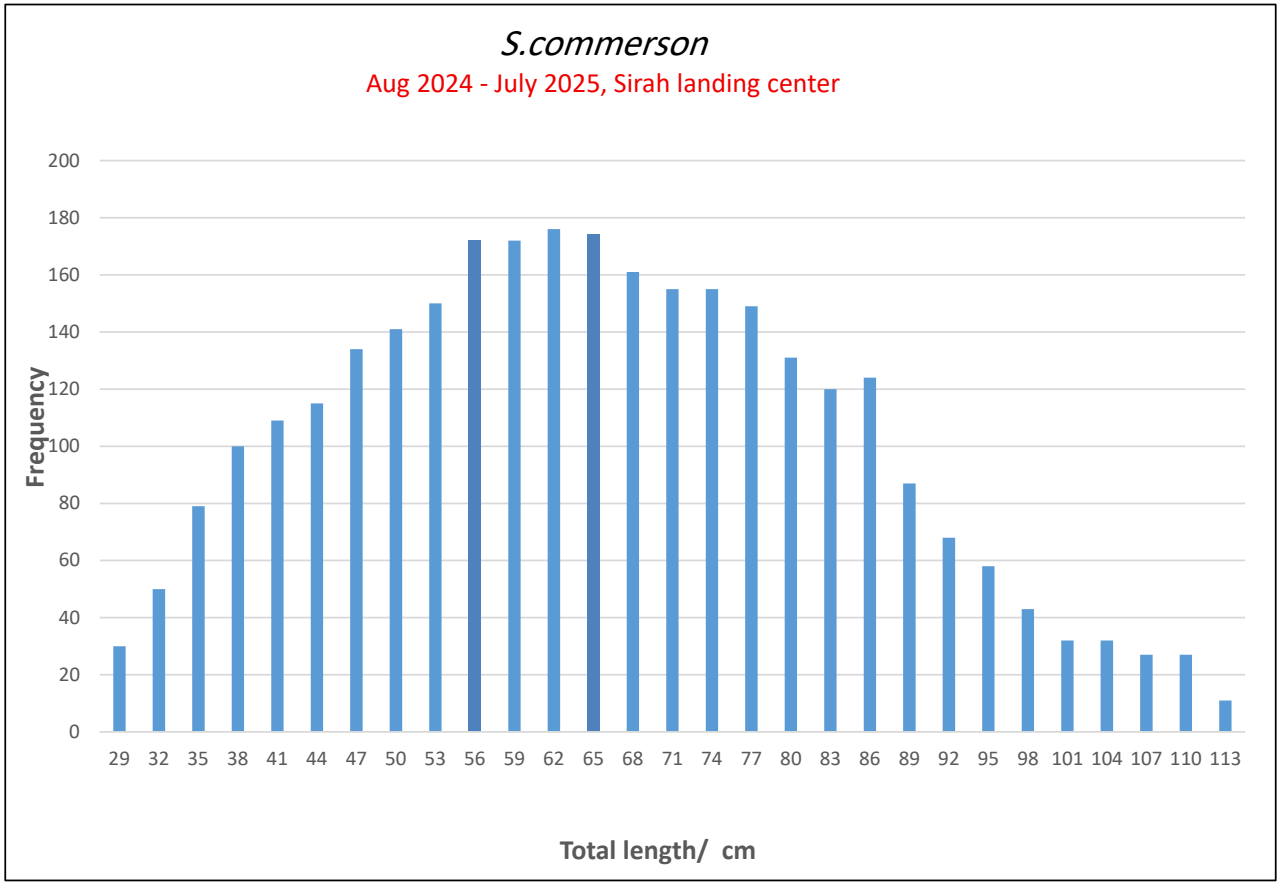
SPECIES (1)

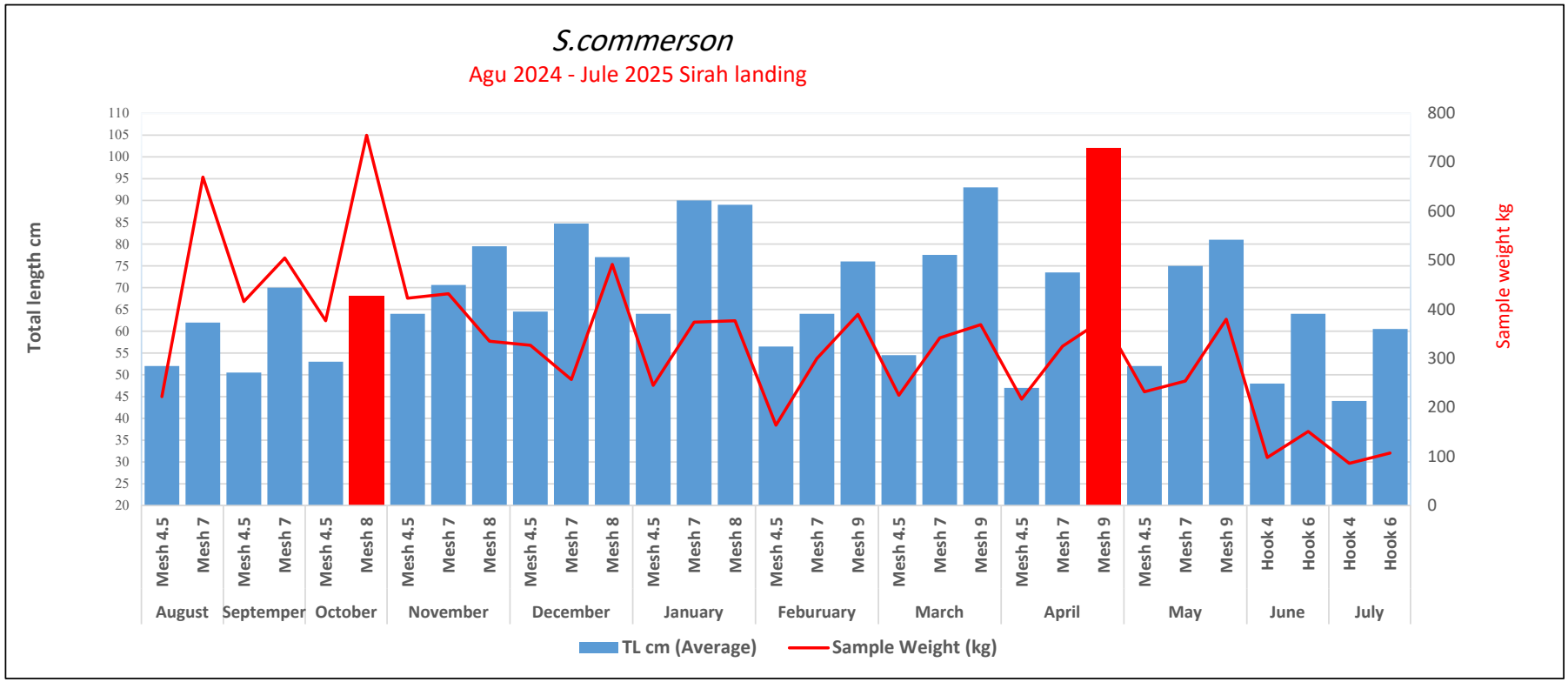
Scomberomorus commerson



The number of *S.commerson* samples collected during the study was 2982 individuals, with details as follows: the largest size was 113 cm, the smallest size was29 cm, the number of classes was 30, The largest size caught was within the long class interval 56- 65 cm while the lowest size caught was the long class 29 – 44 cm as will from 89 – 113. Sexual .maturity at 55 – 82 cm

Fig (2): Length frequencies distribution of *Scomberomorus commerson* from Sirah landing center, Aden, Yemen , August - July 2025.

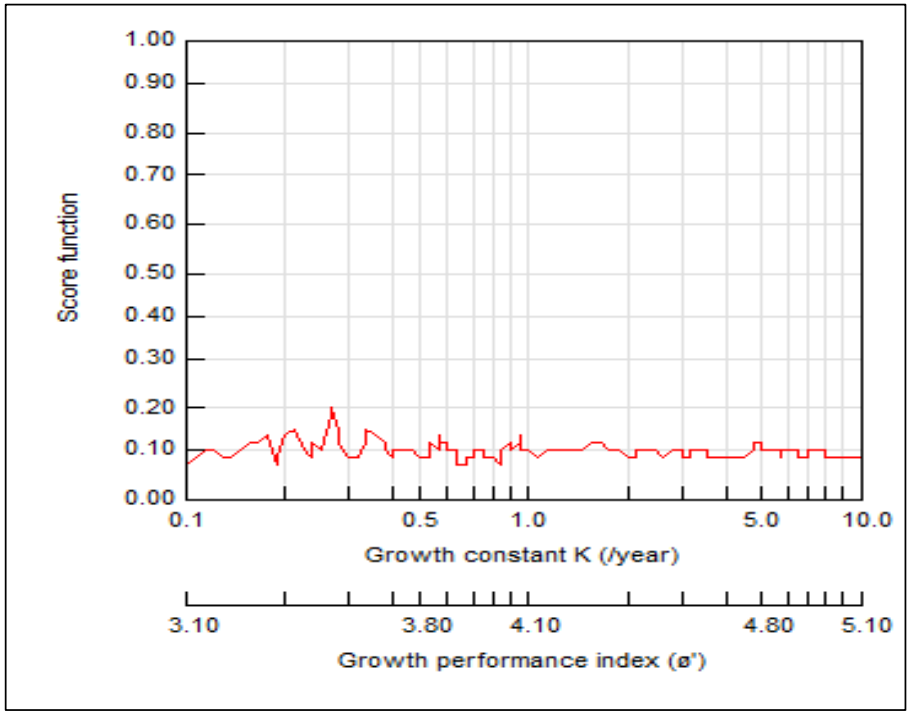
Scomberomorus commerson



Catch data establishes that sample weight is a direct measure of fish abundance, not mean total length (TL). This is strongly evidenced by the peak SW of **700 kg** occurring when the mean TL was only **65 cm** at October while the maximum recorded TL of **105 cm** yielded a significantly lower sample weight of **350 kg** at April. Therefore, high .weight samples indicate greater abundance, irrespective of the average total length

SPECIES (1)

Scomberomorus commerson

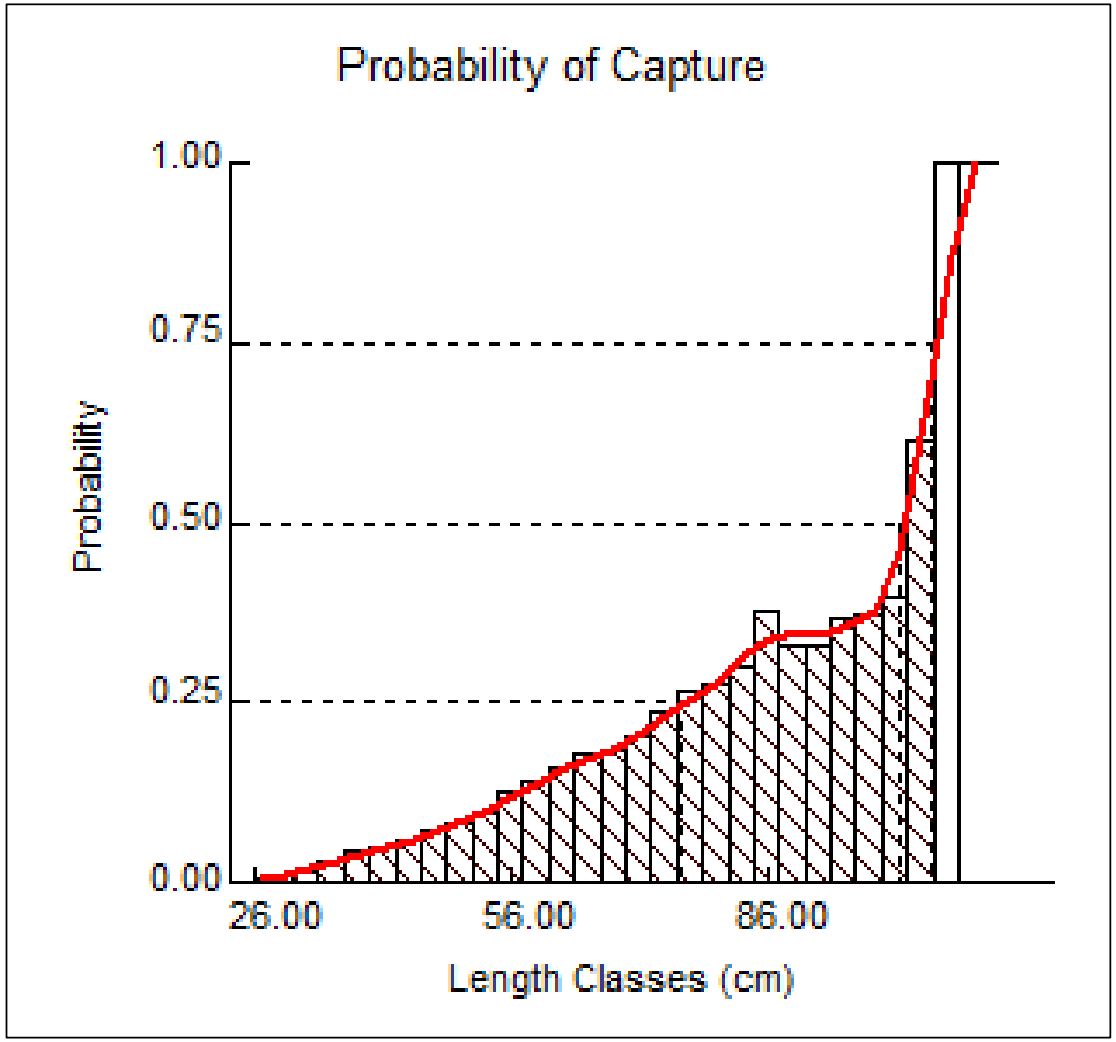


The growth rate of **S commerson** is presented in Figure, length infinity (L∞) =**118.65**, the growth rate (K) 0.27 per year. could be obtained from the growth equation of Von Bertalanffy.

Abstract

Whole otoliths were used to age *Scomberomorus commerson* in tropical Australian waters. Age estimates were validated by marginal-increment analysis of the first three otolith annuli. Confirmation of age estimates was provided by otolith daily growth increments and tag returns of known age. Differential growth in length, weight and longevity was evident between the sexes. The oldest male was 10 years old (127 cm FL, 19·0 kg). The oldest female was 14 years old (155 cm FL, 35 kg). The von Bertalanffy growth parameters L_∞ and K were 127·5 cm and 0·25 for males and 155·0 cm and 0·17 for females.

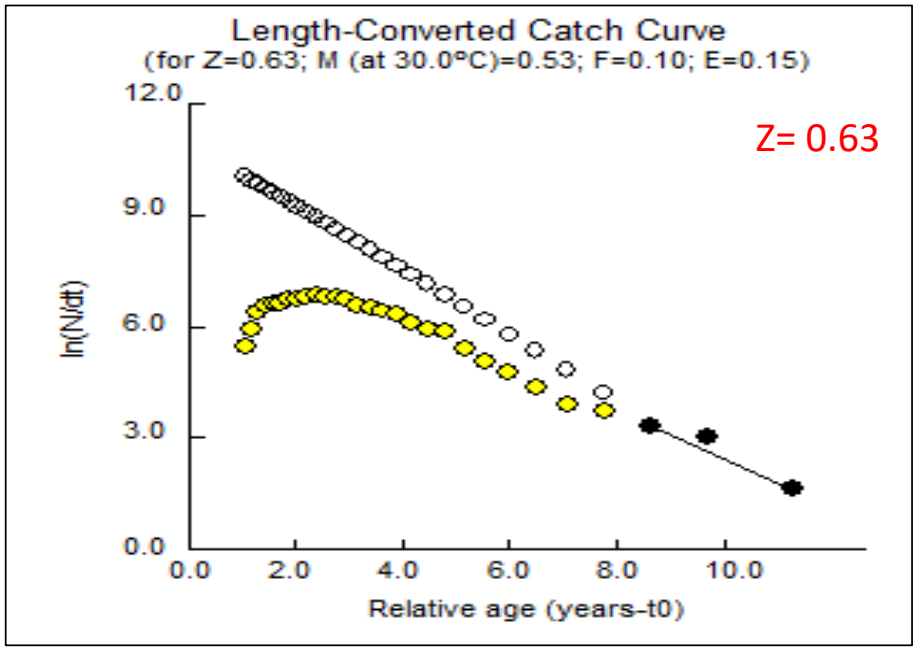
Scomberomorus commerson



Length at first capture (Lc)

According to the resultant curve derived from catch curve, the estimated **Lc/ L∞** was 0.68 for ***S. commerson*** Lc = 25:50:75 was 75.8 ;101.6; 105.2 cm) respectively. The estimated $\mathbf{L_{50}}$ is approximately **80–90 cm**, representing the length at which half of the exposed fish become vulnerable to capture.

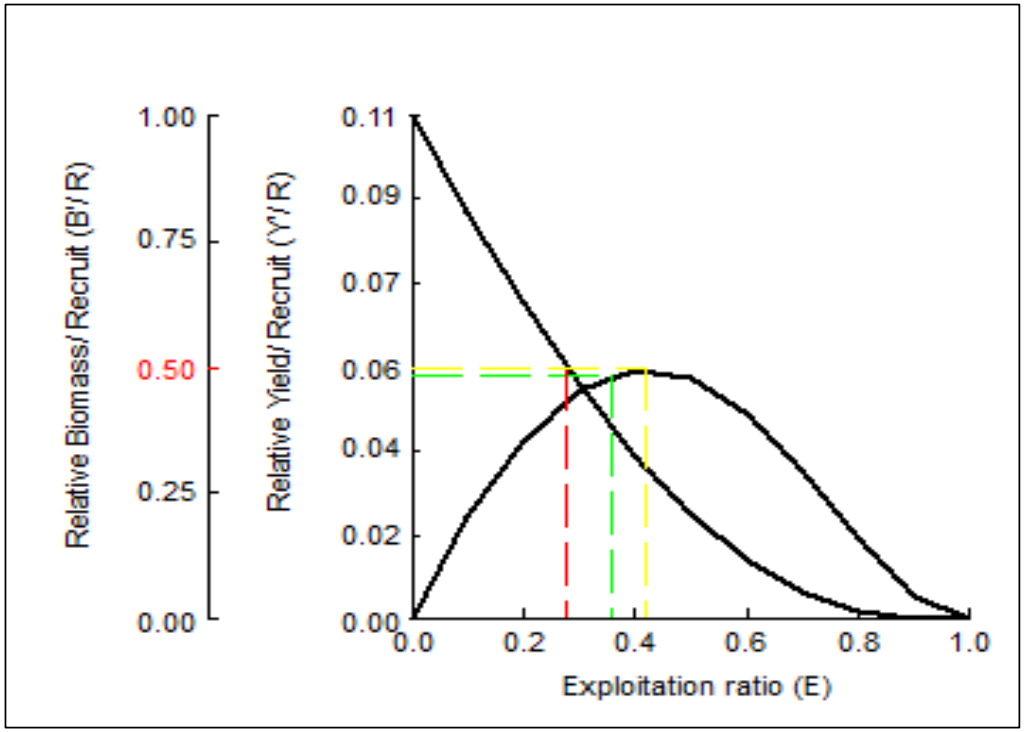
Scomberomorus commerson



The calculation using Pauly's empirical formula, with the parameters including the values of the length of the infinity (L∞) =**118.65**, the growth rate (K) 0.27, and the average temperature during the study so that the values obtained of Z, M, F, and E were presented in **Table**

Mortality value	Estimated value (year-1)
Total mortality (Z)	**0.63**
Natural mortality (M)	**0.53**
Fishing mortality (F)	**0.10**
Exploitation rate (E)	**0.15**

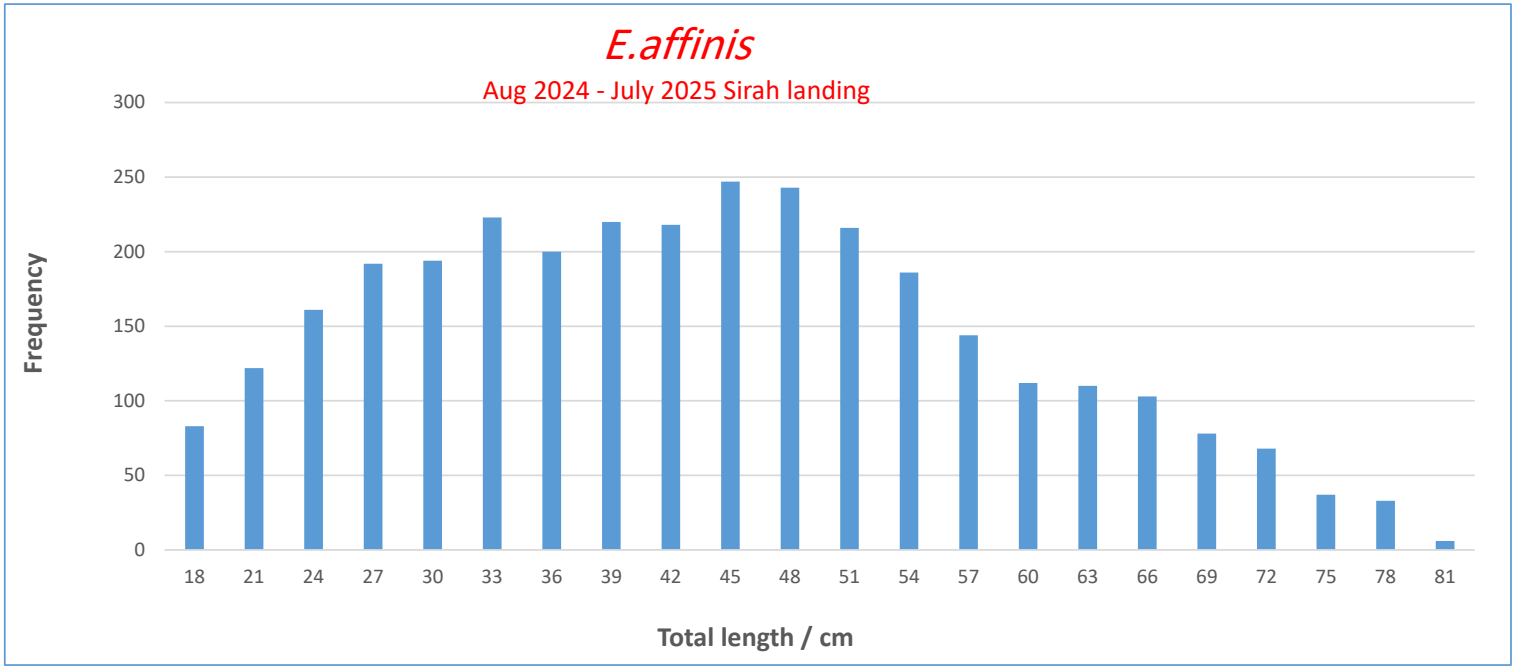
Scomberomorus commerson



The relative Y/R value was 0.052 grams per recruit, and the actual Y/R value was 0.030 grams per recruit The values for E50, E10, Emax were 0.278, 0.355, 0.421 respectively while the exploitation rate was E= 0.15 per year indicating that the exploitation value lese from Emax, E50 and E10. Fishing effort increases access to optimal exploitation E< 0.5.

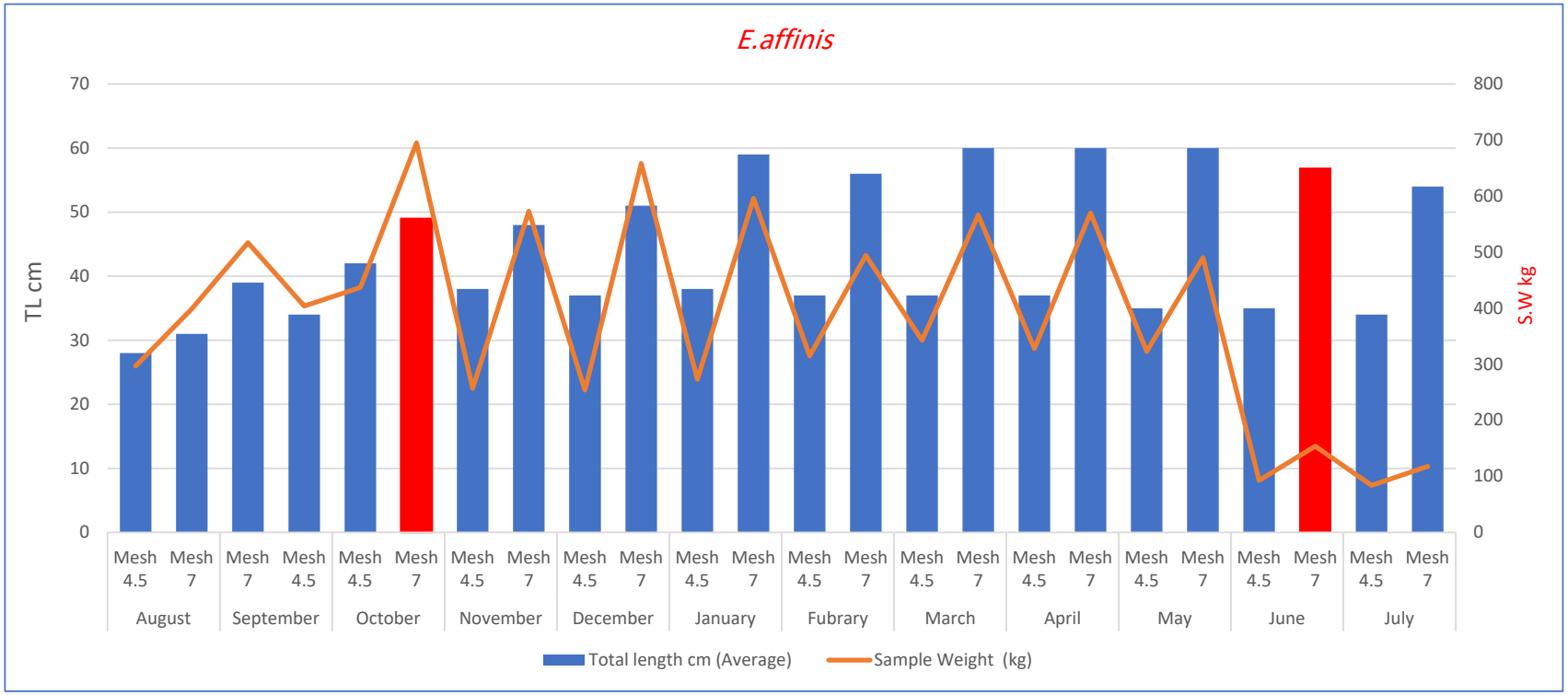
SPECIES (2)

Euthynnus affinis



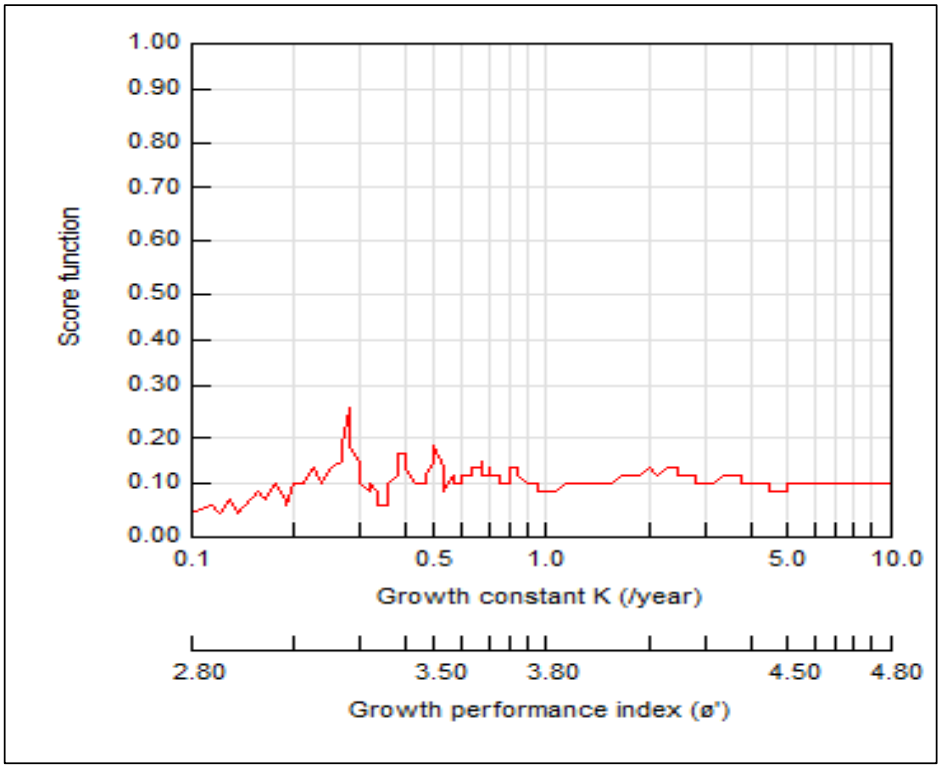
The number samples collected during the study was 31096 individuals, with details as follows: the largest size was 81 cm, the smallest size was 18 cm, the class width was 3, the number of classes was 22, The largest size caught was within the long class interval 27- 54 cm while the lowest size caught was the long class 18 – 24 cm. Also gradually decreased from 57 – 81cm.

Euthynnus affinis



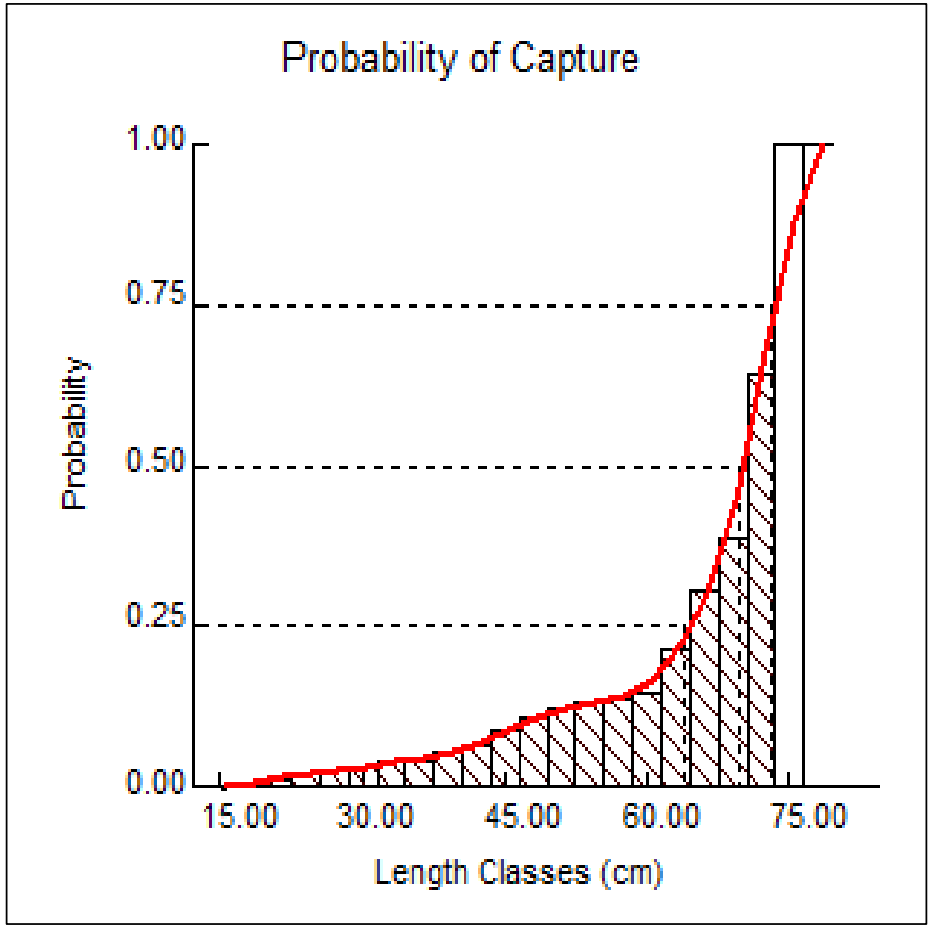
We observe fluctuations in the sample weight from month to month. Despite the high sample weight (**700 kg**) in **October**, the mean length was relatively at **49 cm**. Conversely, the lowest sample weights were recorded in **June** with weights access to **150 kg** while was mean length at **56 cm**.

Euthynnus affinis



Growth parameter analysis was carried out using the FISAT II software ELEFAN I program. As a result, the growth rate of *E.affinis* is presented in Figures. The length of the infinity (L∞) =**85.05** , the growth rate .(K)= 0.28 per year could be obtained from the growth equation of Von Bertalanffy

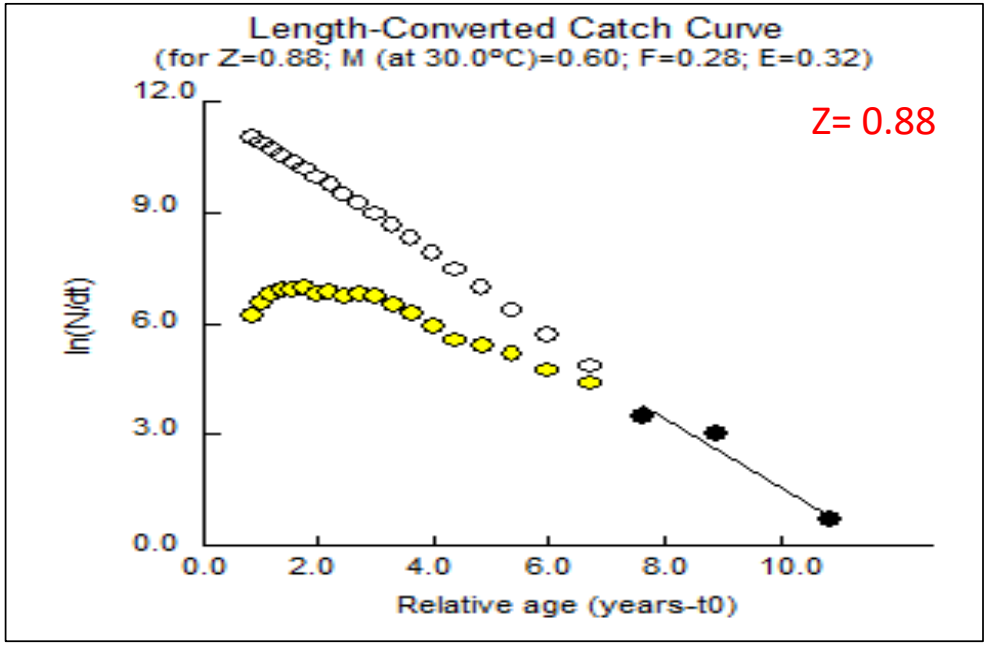
Euthynnus affinis



Length at first capture (Lc)

According to the resultant curve derived from catch curve, the estimated **Lc/ L∞** was 0.82 for ***E.affinis*** Lc = 25:50:75 was 64.04 ;69.71; 73.09 cm) respectively, Fig.17.The estimated **L_{50}** the length at which 50% of individuals are vulnerable to capture is approximately 65–7**0 cm**. Sexual maturity at approximately 37 – 42 cm.

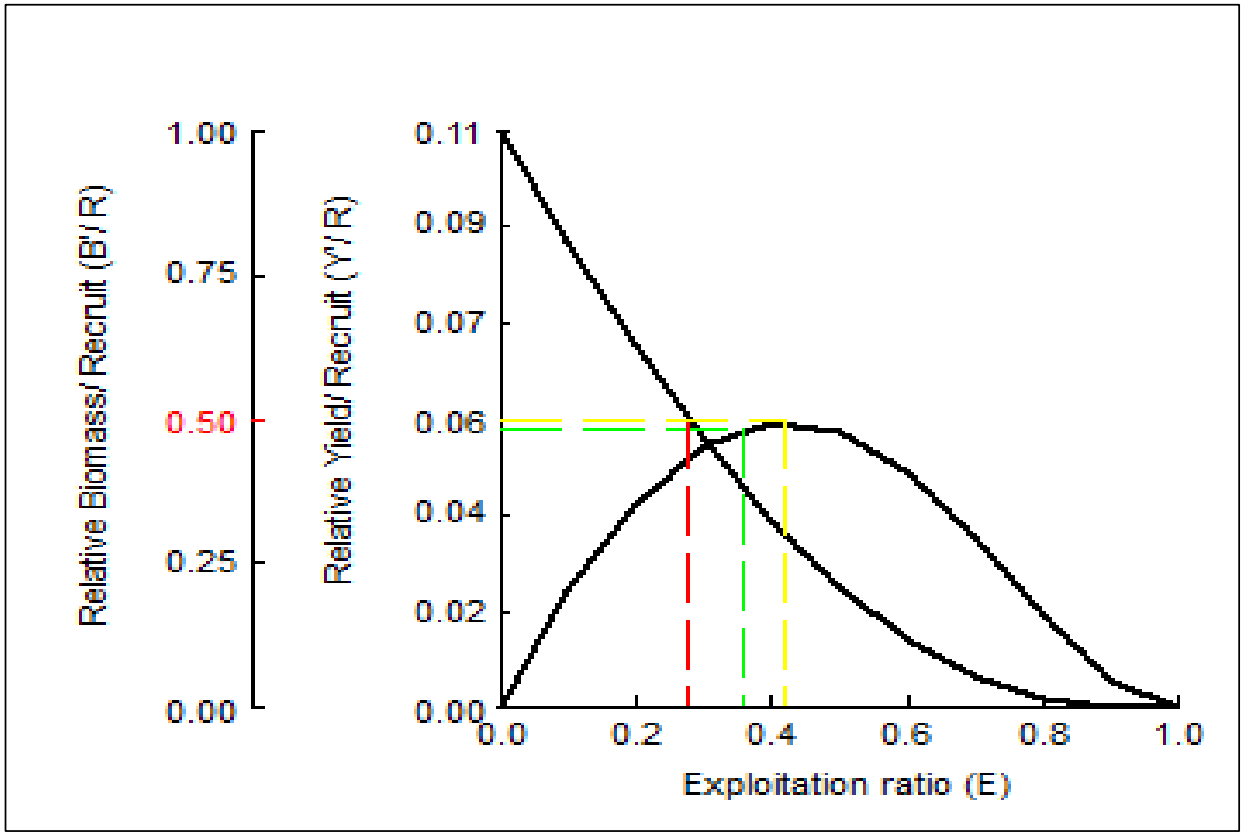
Euthynnus affinis



The calculation using Pauly's empirical formula, with the parameters including the values of the length of the infinity (L∞) =**85.05**, the growth rate (K)= 0.28, and the average temperature during the study so that the values obtained of Z, M, F, and E were presented in Table.

Mortality value	Estimated value (year-1)
Total mortality (Z)	**0.88**
Natural mortality (M)	**0.59**
Fishing mortality (F)	**0.28**
Exploitation rate (E)	**0.32**

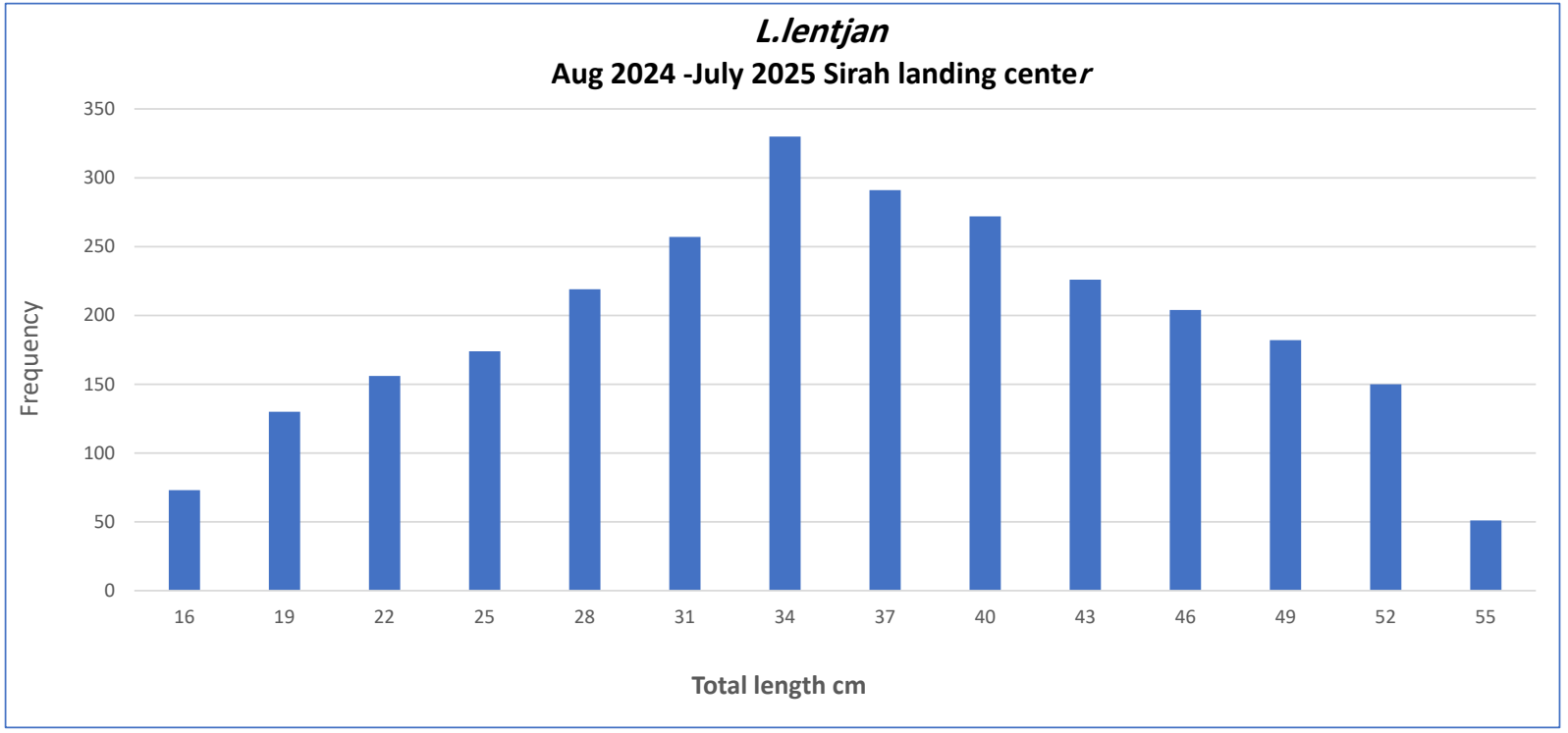
Euthynnus affinis



The relative Y/R value was 0.058 grams per recruit, and the actual Y/R value was 0.055 grams per recruit, and the values for E50, Emax, and E10 were 0.278, 0.421and 0.355, respectively, while the exploitation rate was E= 0.32 per year indicating that the exploitation value lese from Emax. Fishing effort increases access to optimal exploitation $E < 0.5$.

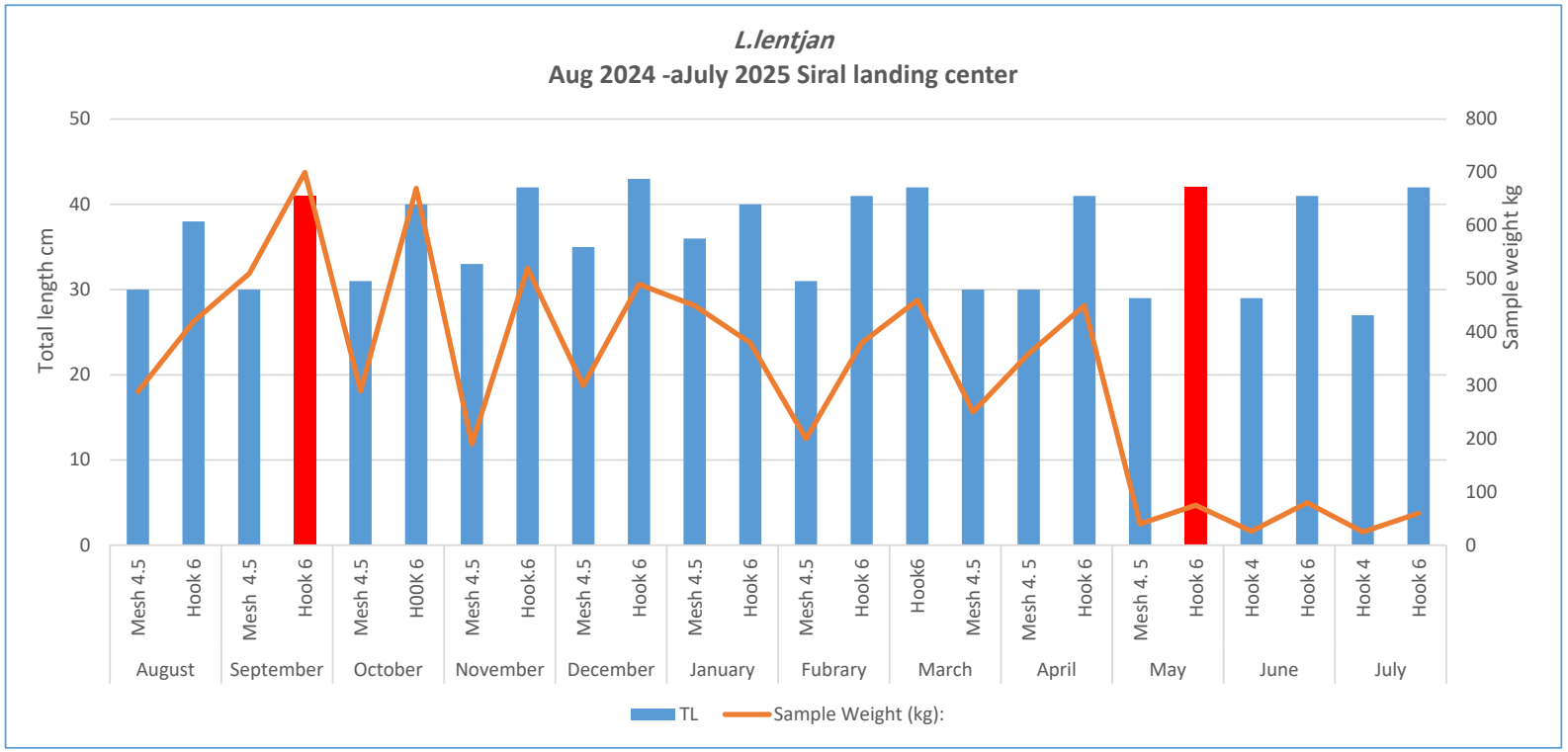
SPECIES (3)

Lethrinus lentjan



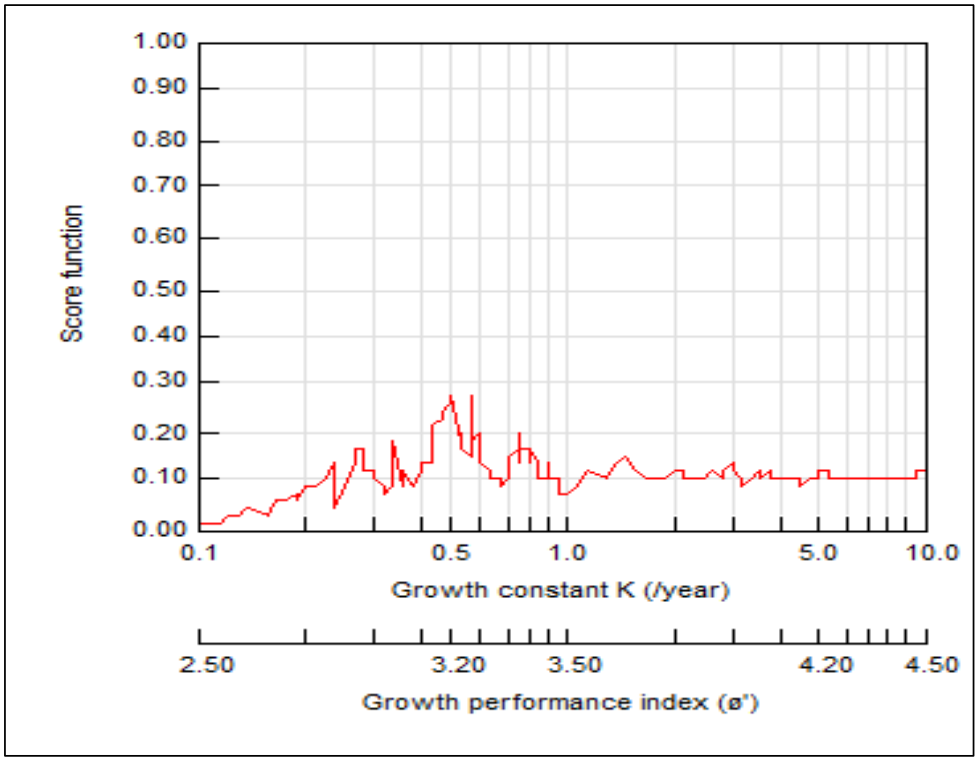
The number of samples collected during the study was 2715 individuals, with details as follows: the largest size was 55 cm, the smallest size was 16 cm, the number of classes was 14. The largest size caught was within the long class interval 31- 40 cm while the lowest size caught was the long class 16– 28 cm. Also gradually decreased from 43 – 55 cm.

Lethrinus lentjan



The sample weight shows significant seasonal fluctuations throughout the year, with the highest sample weight recorded in **September** 2024 when mean length 40 cm while **May** was the sample weight decreased when mean length 41 cm. There is no direct relationship between mean length and sample weight, at May the average length was high, while the sample weight was low.

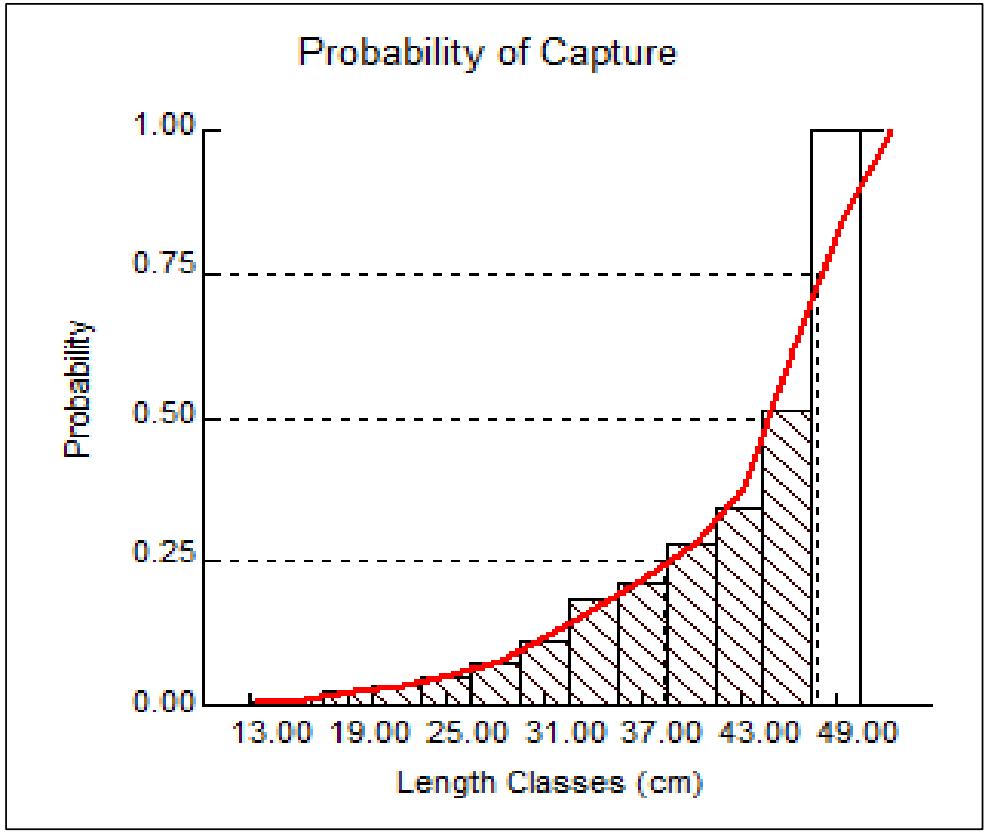
Lethrinus lentjan



Population growth

Growth parameter analysis was carried out using the FISAT II software ELEFAN I program. The length of the infinity (L∞) = **57.75** , the growth rate (K)= 0.56 per year could be obtained from the growth equation .of Von Bertalanffy

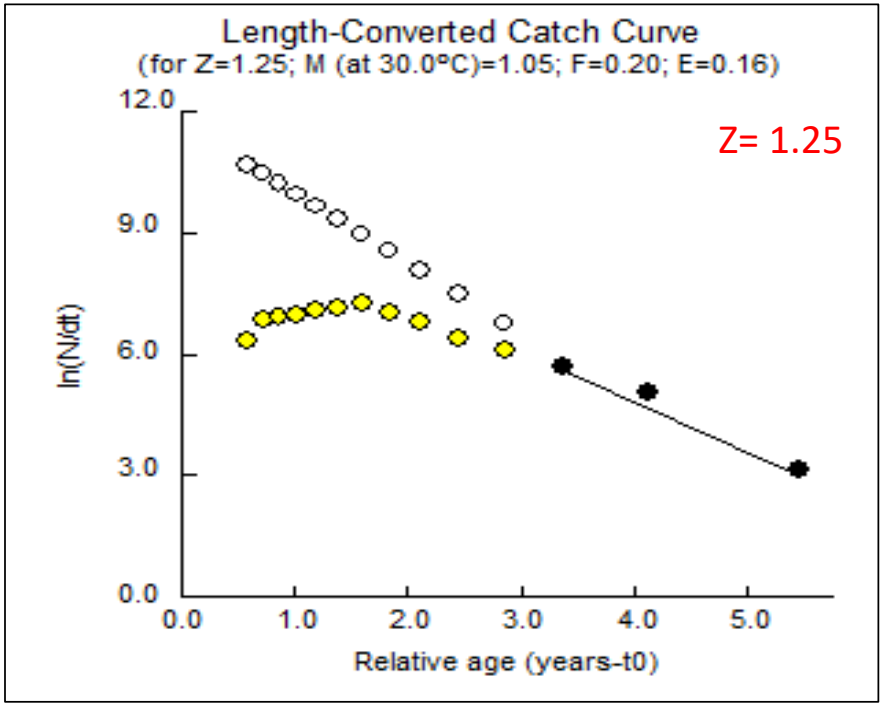
Lethrinus lentjan



Length at first capture (Lc)

According to the resultant curve derived from catch curve, the estimated **Lc/ L∞** was 0.77 for ***L.lenjan*** Lc = 25:50:75 was 38.25 ;44.50; 47.79 cm) respectively, The estimated $\mathbf{L_{50}}$ the length at which 50% of individuals are vulnerable .to capture is approximately **39–43 cm**.Sexual maturity at 27.7 cm

Lethrinus lentjan

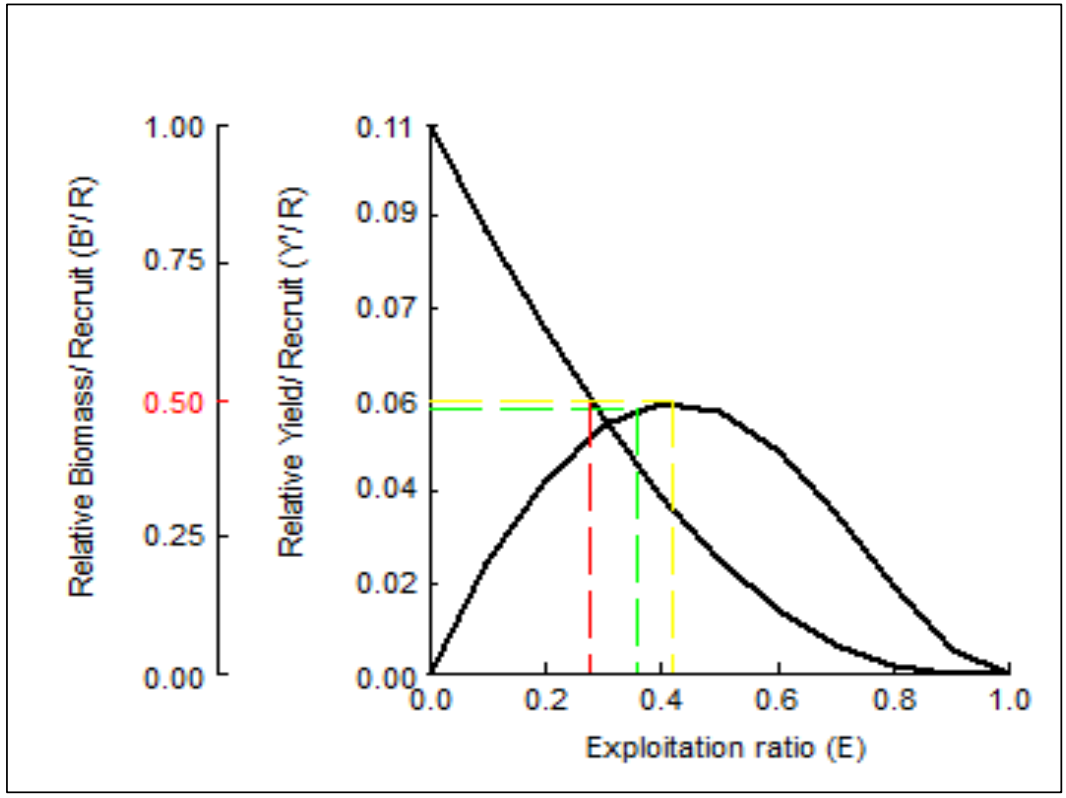


Mortality and exploitation

The calculation using Pauly's empirical formula, with the parameters including the values of the length of the infinity (L∞) =**57.75**, the growth rate (K)= 0.56, and the average temperature during the study so that the values obtained of Z, M, F, and E were presented in Table

Mortality value	Estimated value (year-1)
Total mortality (Z)	**1.25**
Natural mortality (M)	**1.05**
Fishing mortality (F)	**0.20**
Exploitation rate (E)	**0.16**

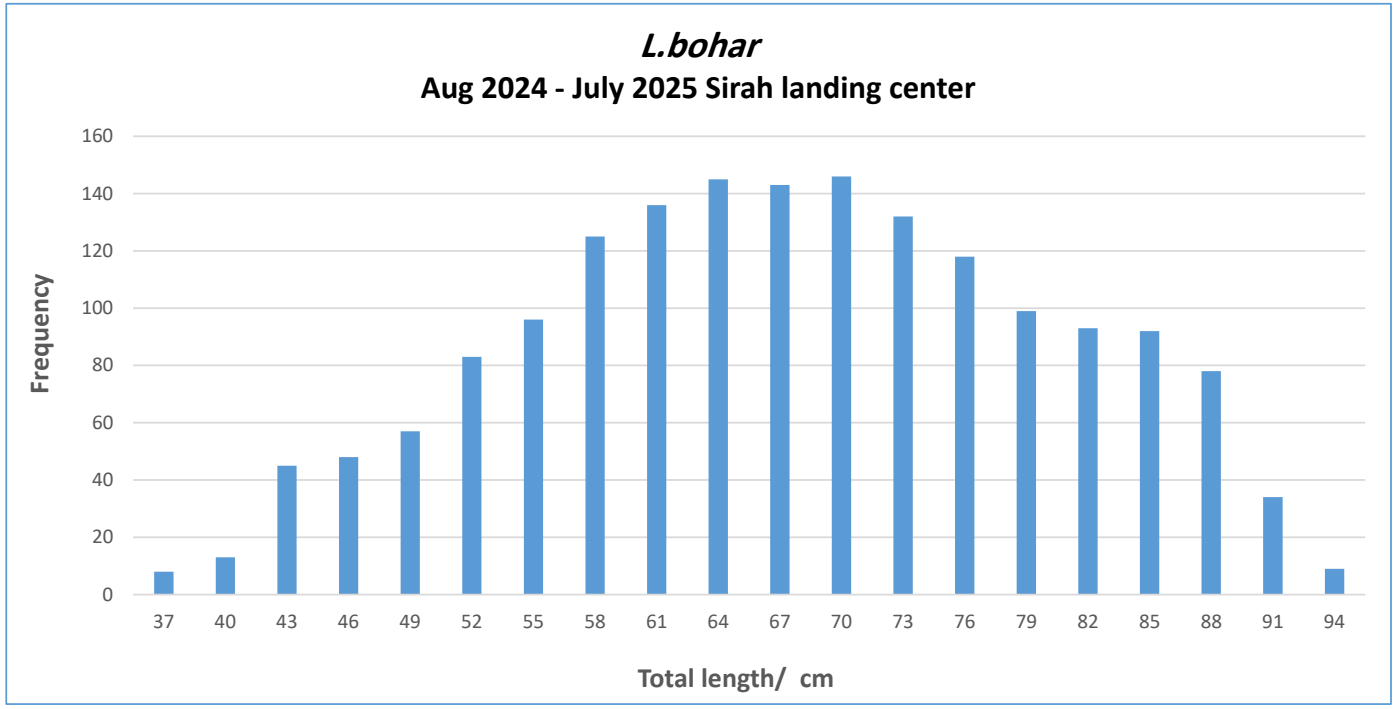
Lethrinus lentjan



The relative Y/R value was 0.052 grams per recruit, and the actual Y/R value was 0.032 grams per recruit, and the values for E50, Emax, and E10 were 0.278, 0.421and 0.355, respectively while the exploitation rate was E= 0.16 per year indicating that the exploitation value lese from E50. Fishing effort increases access to optimal exploitation $E < 0.5$.

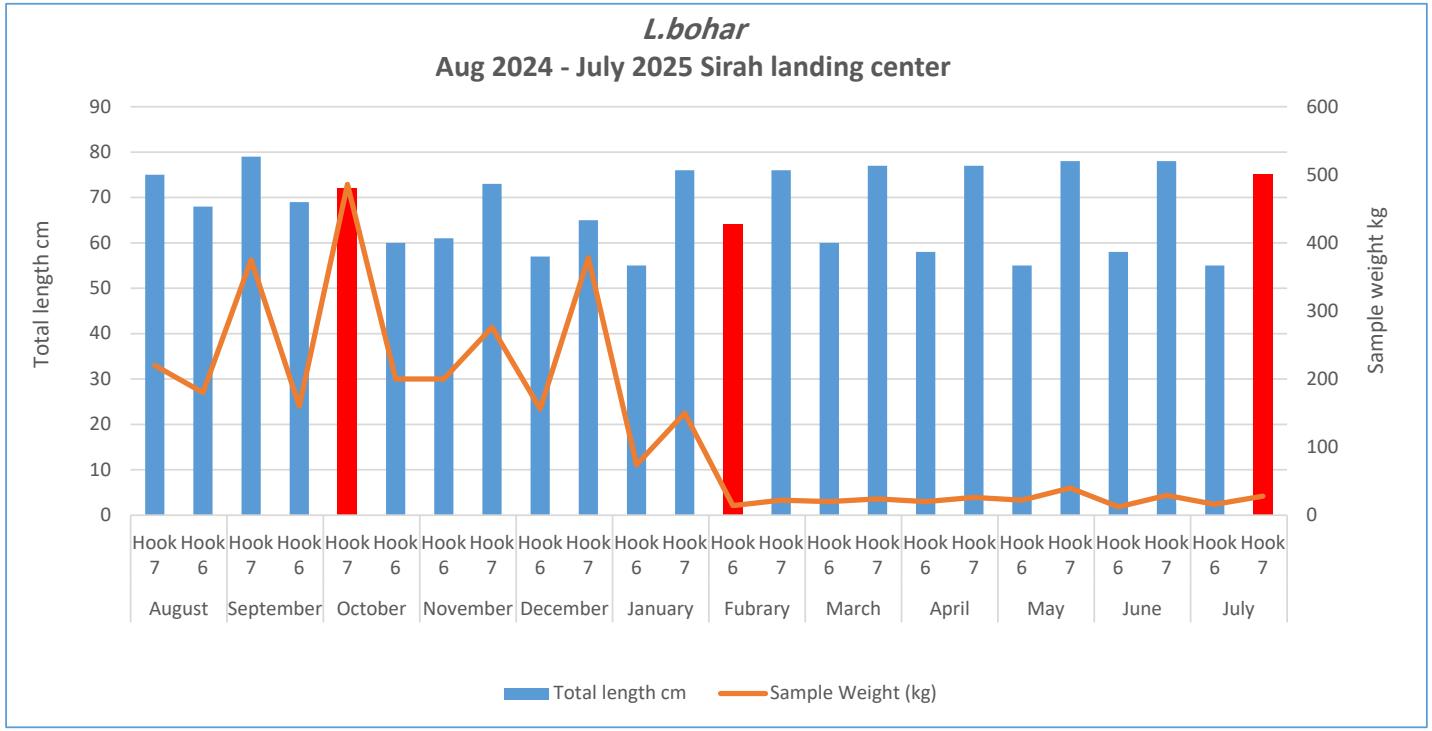
SPECIES (4)

Lutjanus bohar



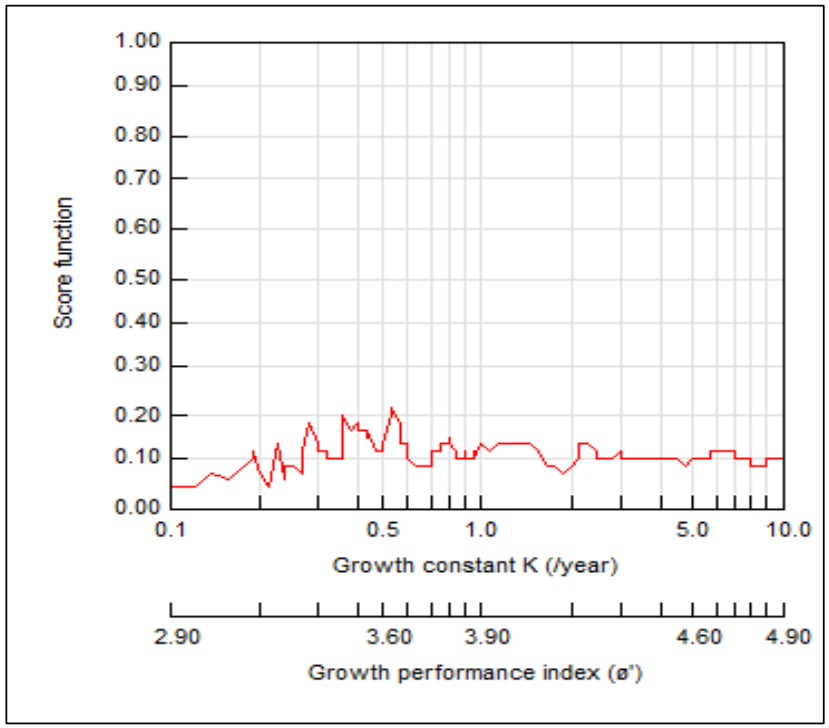
The number of samples collected during the study was 1700 individuals, with details as follows: the largest size was 94 cm, the smallest size was 37 cm, the number of classes was 20, The largest size caught was within the long class interval 58- 76 cm while the lowest size caught was the long class 37 – 55 cm. Also gradually decreased from 79 – 94 cm. Sexual maturity at 42.9 cm.

Lutjanus bohar



Sample weights show a clear seasonal fluctuation, with the **highest** sample weights recorded from **October** 2024 reaching **400 kg**. A lowest in sample weights was recorded from **February to July** 2025, with some samples reaching **10 kg**. We conclude that the average length was high during the months of .January to July, reaching 78 cm, but Sample weights were lowest

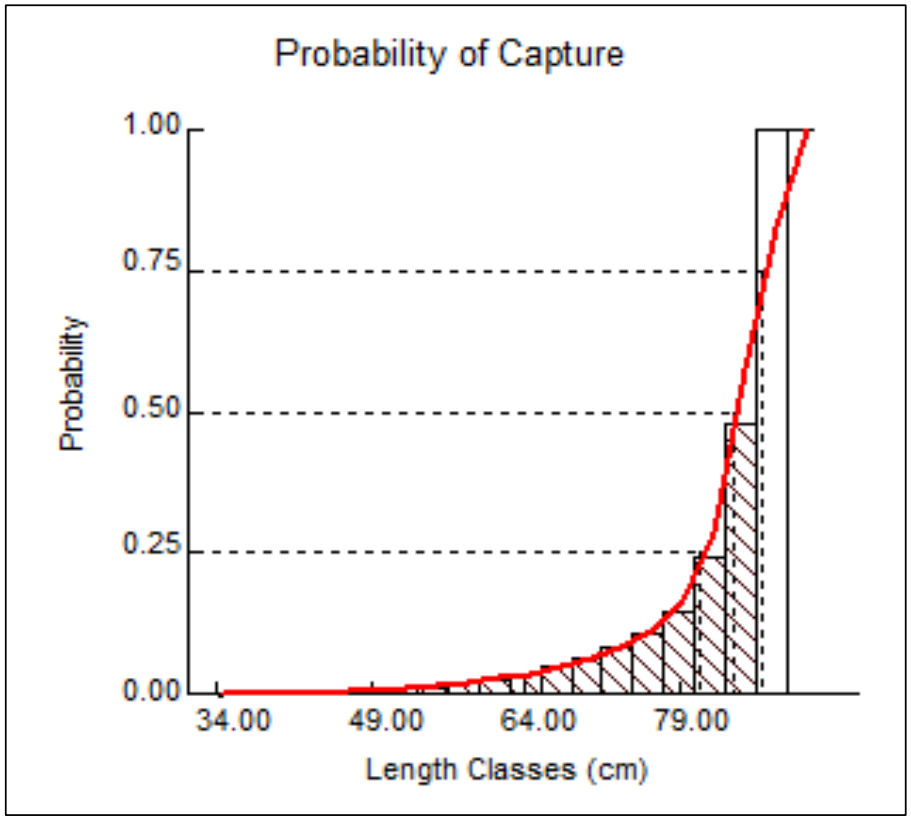
Lutjanus bohar



Population growth

Growth parameter analysis was carried out using the FISAT II software ELEFAN I program. The length of the infinity ($L\infty$) =**98.70**, the growth rate (K)= 0.54 per year could be obtained from the growth equation of Von .Bertalanffy

Lutjanus bohar



Length at first capture (Lc)

According to the resultant curve derived from catch curve, the estimated **Lc/ L∞** was 0.85 for ***L. bohar;*** Lc = 25:50:75 was 81.07; 84.24; 87.11cm) respectively. The estimated $\mathbf{L_{50}}$ (length at 50% capture probability) is approximately **78–80 cm**. Sexual .maturity at 43 cm

Lutjanus bohar

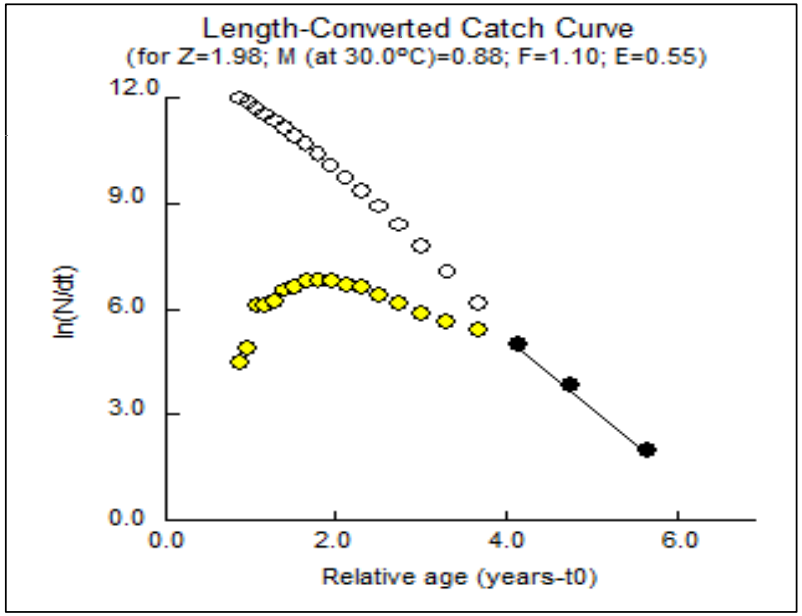


Table : Z, M, F, and E values of *L. bohar* in the present study.

Mortality value	Estimated value (year-1)
Total mortality (Z)	**1.98**
Natural mortality (M)	**0.88**
Fishing mortality (F)	**1.10**
Exploitation rate (E)	**0.55**

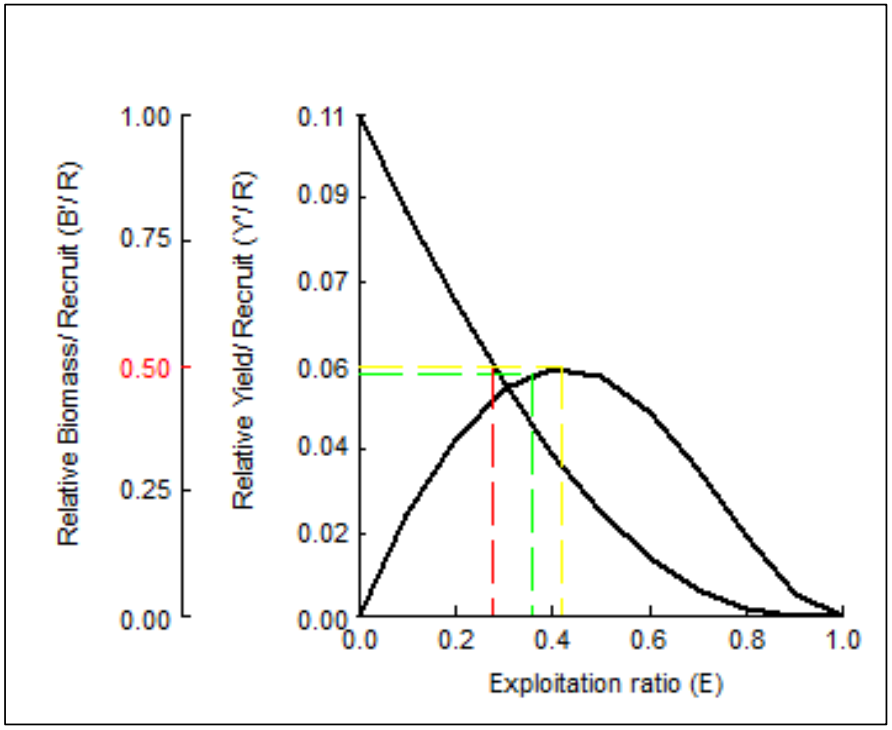
Mortality and exploitation

The calculation using Pauly's empirical formula, with the parameters including the values of the length of the infinity (**L∞) =98.70**, the growth rate (**K)= 0.54**, and the average temperature during the study so that the values obtained of Z, M, F, and E were presented in Table;

Table 3. Z, M, F, and E values of *Lutjanus malabaricus* in the Timor Sea waters, Indonesia

Mortality value	**Estimated value (year^{-1})**
Total mortality (Z)	1.98
Natural mortality (M)	0.84
Fishing mortality (F)	1.14
Exploitation rate (E)	0.58

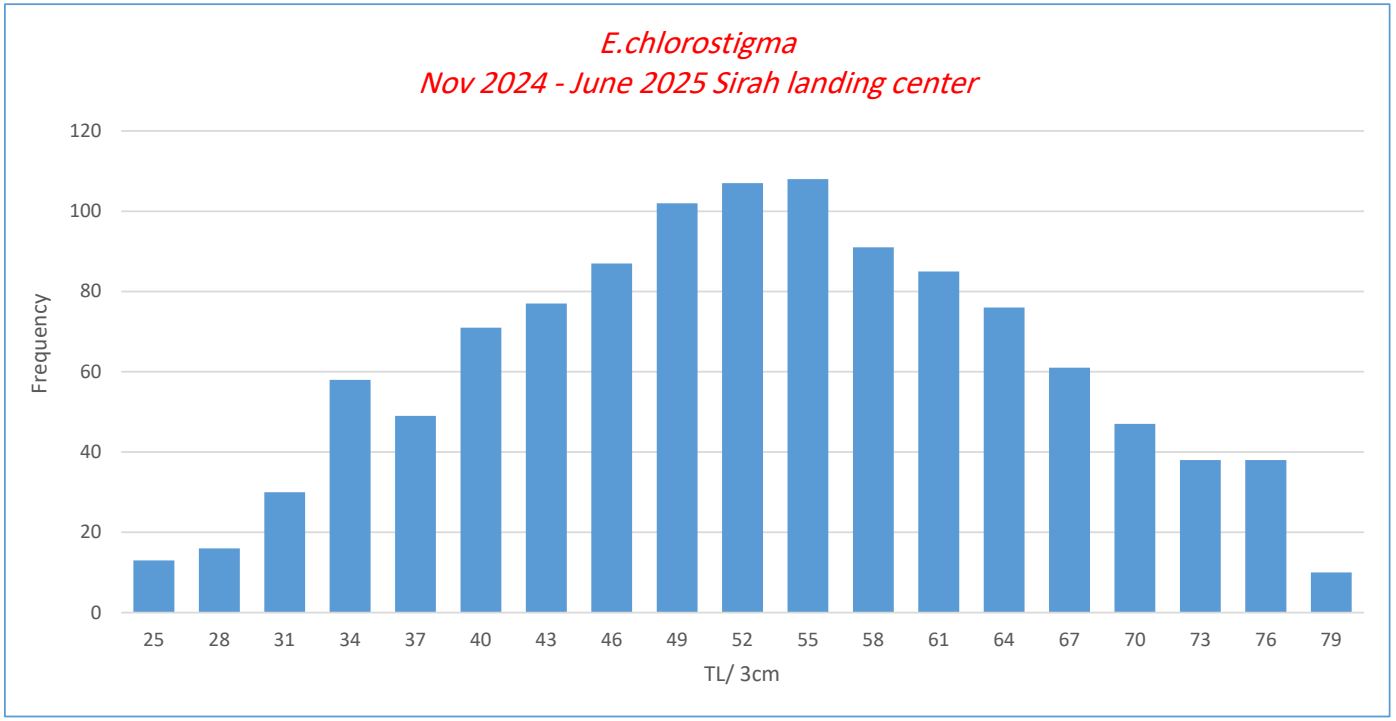
Lutjanus bohar



The relative Y/R value was **0.060** grams per recruit, and the actual Y/R value was **0.049** grams per recruit, and the values for E50, Emax, and E10 were 0.278, **0.421**and 0.355, respectively while the exploitation rate was **E= 0.55** per year indicating that the exploitation value exceeded the maximum exploitation value Emax, Reducing fishing effort to achieve optimal exploitation **E<05**.

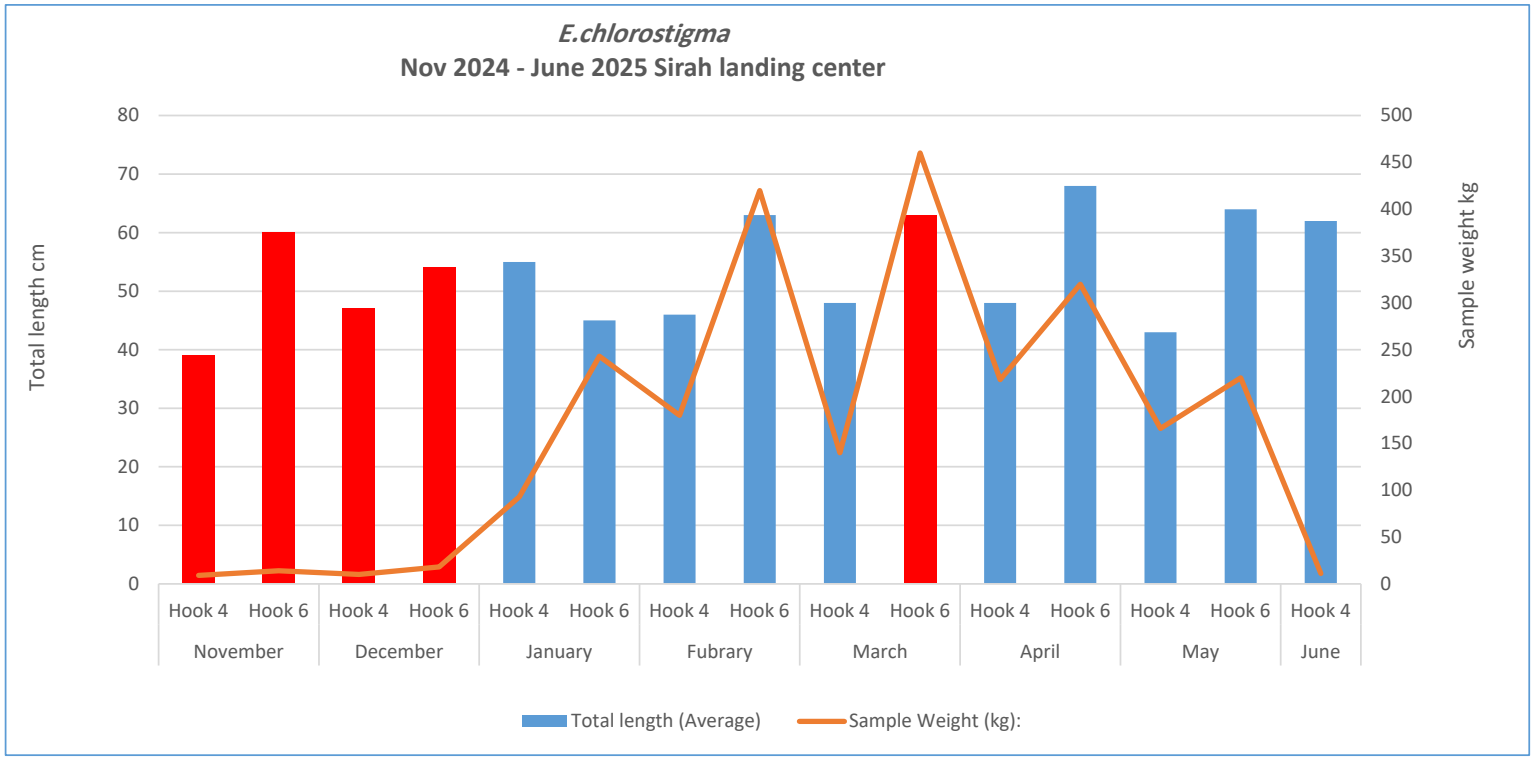
SPECIES (5)

Epinephelus chlorostigma



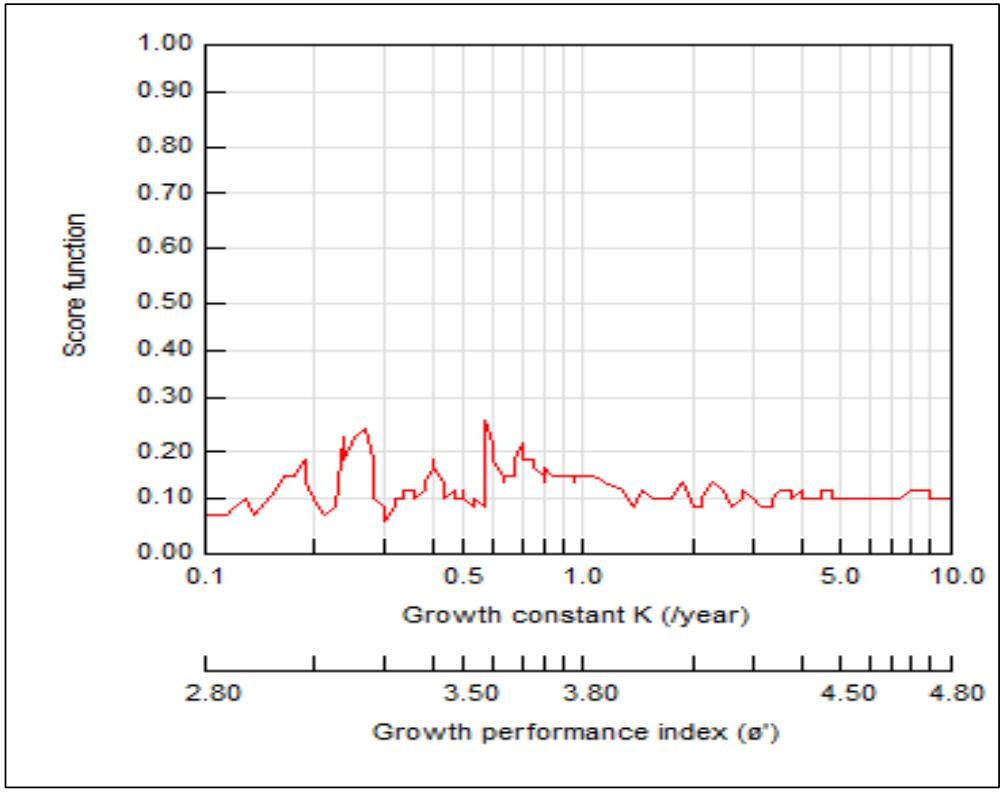
The number of samples collected during the study was 1164 individuals, with details as follows: the largest size was 79 cm, the smallest size was 25 cm, the number of classes was 19, The largest size caught was within the long class interval 46- 61 cm while the lowest size caught was the long class 25 – 43 cm. Also gradually decreased from 64 – 79 cm.

Epinephelus chlorostigma



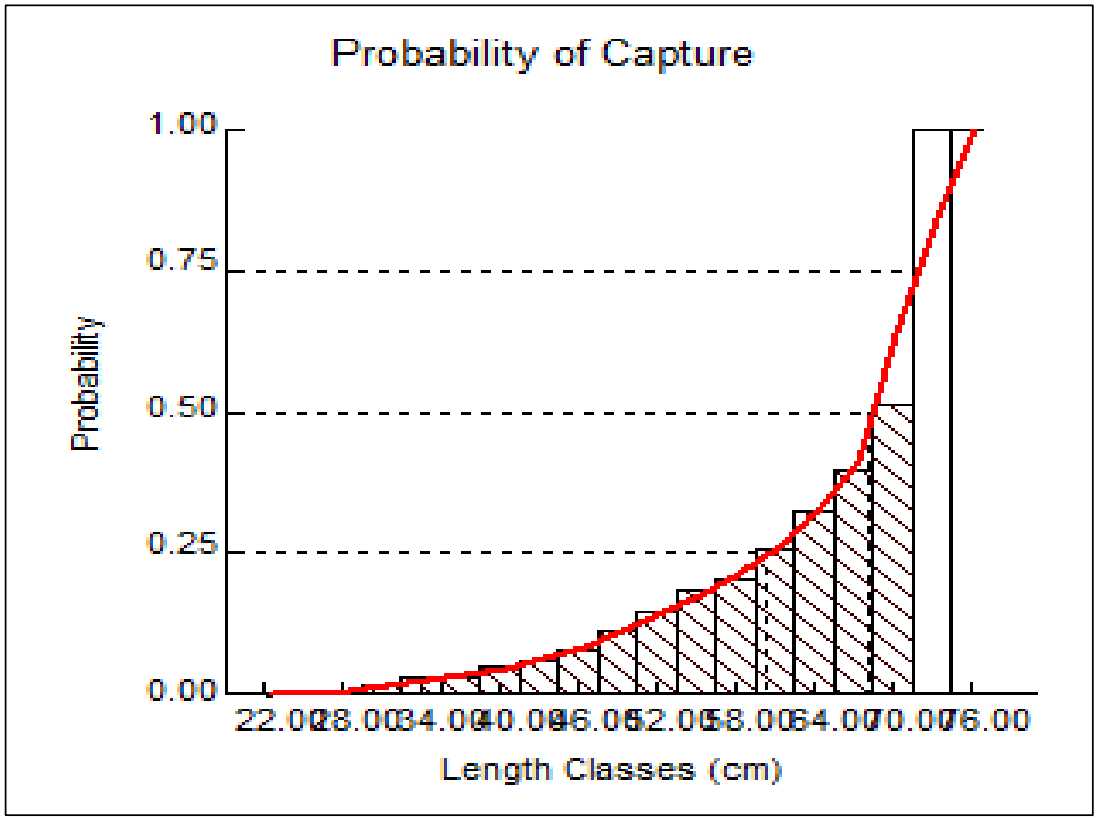
The lowest sample weight **(50 kg)** was recorded in **November** and **Decembe**r while the highest sample weights were recorded at **March**, reaching **450 kg**. Note that hook 6 was associated with higher average lengths in November, highest average length recorded in **April** using hook 6 was 68cm whit a decreas .sample weight

Epinephelus chlorostigma



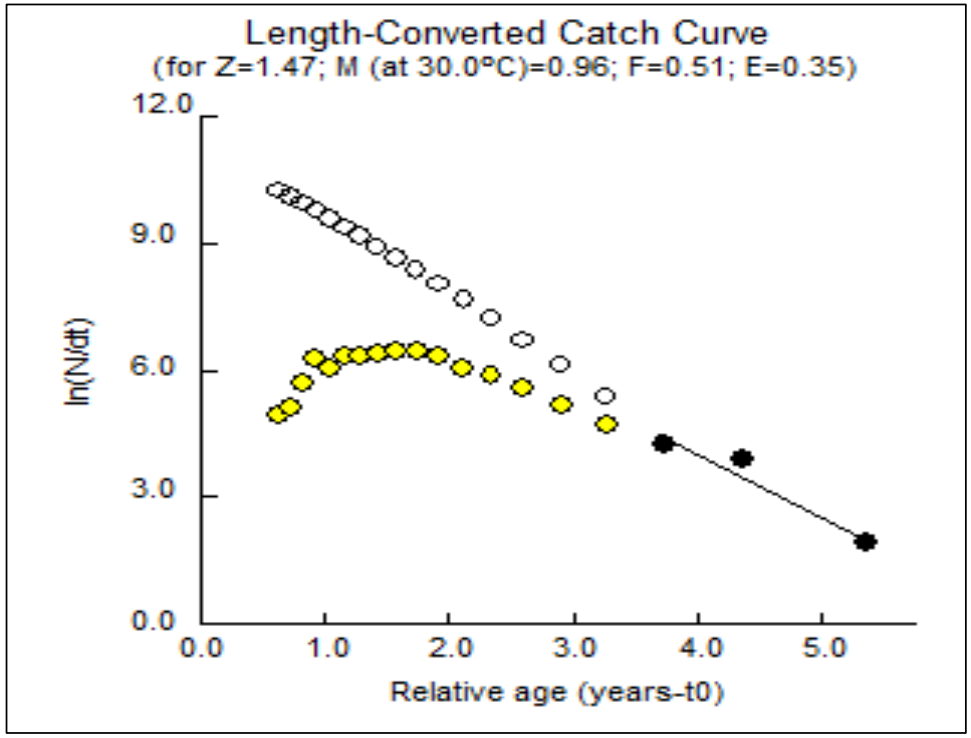
Growth parameter analysis was carried out using the FISAT II software ELEFAN I program . The length of the infinity (L∞) =**82.95**, the growth rate (K)= **0.57** per year could be obtained from the growth equation of .Von Bertalanffy

Epinephelus chlorostigma



According to the resultant curve derived from catch curve, the estimated **Lc/ L∞** was 0.82 for *E. chlorostigma* Lc = 25:50:75 was 60.34;68.18; 71.69 cm) respectively, The estimated **L_{50}** (length at 50% capture probability) is approximately **64– 70** cm. Sexual maturity at 23 - 31 cm.

Epinephelus chlorostigma

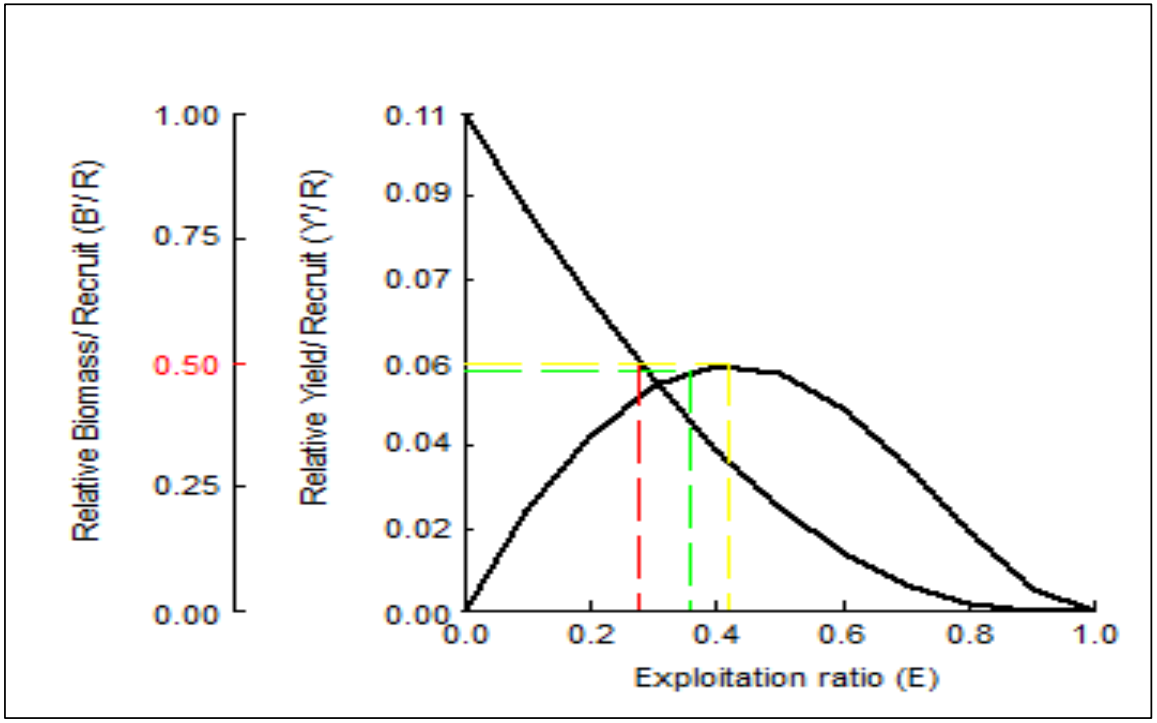


Mortality and exploitation

The calculation using Pauly's empirical formula, with the parameters including the values of the length of the infinity (L∞) =**82.95**, the growth rate (K)=0.57, and the average temperature during the study so that :the values obtained of Z, M, F, and E were presented in Table

Mortality value	Estimated value (year-1)
Total mortality (Z)	1.47
Natural mortality (M)	0.95
Fishing mortality (F)	0.51
Exploitation rate (E)	0.35

Epinephelus chlorostigma



The relative Y/R value was **0.060** grams per recruit, and the actual Y/R value was **0.058** grams per recruit, and the values for E50, Emax, and E10 were **0.278, 0.421**and **0.355**, respectively while the exploitation rate was **E= 0.35** per year indicating that the exploitation value equal E10 and less Emax. exploitation sustainable at 0.35 and does not exceed 0.5.

Table: Population parameters of species from Sirah landing center –Gulf of Aden

Mortality value	*S.commerson*	*E.affinis*	*L.lentjan*	*L.bohar*	*E.chlorostigma*
Total mortality (Z)	0.63	0.88	1.25	1.98	1.47
Natural mortality (M)	0.53	0.59	1.05	0.88	0.95
Fishing mortality (F)	0.10	0.28	0.20	1.10	0.51
Exploitation rate (E)	0.15	0.32	0.16	0.55	0.35
Grouth rate (K)	0.27	0.28	0.56	0.54	0.57
length of the infinity (L∞)	118.65	85.05	57.75	98.70	82.95

Recommendations

- Maintain sustainable fishing practices: For under-exploited species (*S. commerson, L. lentjan*), a moderate increase in fishing effort, accompanied by strict monitoring to ensure optimal exploitation and continue to assessment these species along the coast.
- Reduce fishing pressure on over-exploited stocks: Immediate management measures should be implemented for *L. bohar*, including some temporary restrictions..
- Enhance data collection and monitoring: Continuous monitoring of growth parameters, mortality rates, and catch composition is essential for updating stock assessments.
- Promote ecosystem-based management: Management approaches should consider environmental factors influencing mortality and recruitment to ensure long-term sustainability.
- Capacity building and stakeholder participation: Engage fishermen and fisheries authorities in awareness programs to promote sustainable fishing practices.
- Monitoring the fishing gear used to ensure the sustainability of fisheries.

PERSGA

THANK YOU VERY MUCH