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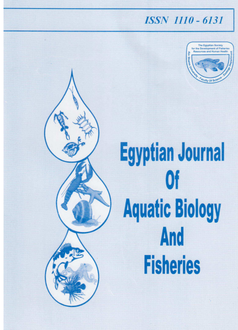

Studies on age, growth, and mortality rates for management of the redspot emperor, *Lethrinus lentjan* (Lacepède, 1802) in the Egyptian sector of Red Sea

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ABSTRACT

Age, growth and mortality are very important parameters for rational exploitation and management of the fish population. Age, growth, mortality and exploitation rates were studied to assess the current status of the redspot emperor *Lethrinus lentjan* stock in the Egyptian sector of Red Sea. The study was based on a total of 943 specimens that collected during 2014 and 2015 with total length range of 11.5 to 50.7 cm. Results showed that, the maximum life span of *L. lentjan* in the Egyptian Red Sea was 6 years and age group one is the most frequent one forming up to 54% of the total catch. *L. lentjan* attains its highest growth in length at the end of the first year of life (24.45 cm) after which the annual increment in length decreases gradually with the further increase in age. The b-value of length-weight relationship was estimated at 3.03 indicating a tendency towards isometric growth. The composite coefficient "k_c" and the relative condition factor "K_n" were fluctuated according to different fish length groups and months. The length at first capture was L_c = 20.11 cm with corresponding age T_c = 0.58 year**.** The total mortality of *L. lentjan* (Z= 1.52/yr), natural mortality (M = 0.35/yr) and fishing mortality (F = 1.17/yr) were lead to an exploitation ratio of E = 0.77. The high values of both F and E are reflecting the high level of exploitation of this species in the Egyptian Red Sea waters.

INTRODUCTION

The Red Sea is deep and narrow sea, extends from Suez (Lat 30^0 N) in the north to Bab El Mandab (Lat 12^0 S) in the south. Its length is nearly 2150 km with an average width of 280 km and 2000 meters in its greatest depth (Head, 1987). The Egyptian Red Sea sector is about 1080 km from Suez in the north to Mersa Halayab in the south (Mehanna, 1996). Like other tropical and subtropical seas, the Red Sea is characterized by rich and diversified fauna and flora (Morcos, 1970; Sheikh-Eldin, 1988 and Ghisotti, 1995). There are several fishing grounds along the Egyptian sector of the Red Sea with a mean annual catch of about 30 thousand tons (Mehanna, 2005; Mehanna and El-Gammal, 2007).

Family Lethrinidae contains about 39 species which are widely distributed in tropical and subtropical areas all over the world. Lethrinids are bottom-feeders, carnivorous, coastal fishes, ranging primarily on or near reefs to depths of 100-220m. The lethrinid subfamily Lethrininae comprises about 28 species (Carpenter and Allen, 1989). In the Egyptian Red Sea, emperors contribute about 22% of the total landings of the artisanal fishery (2000 - 2014) earning about 150 million LE annually.

At least eight lethrinid species are found in the Egyptian Red Sea (Mehanna, 2011) from which the redspot emperor *Lethrinus lentjan* is one of the most common and important species. It is widespread in the Indo-West Pacific, including the Red Sea, Arabian Gulf and East Africa to the Ryukus Tonga. This fish is found over the sandy bottom in coastal areas, deep lagoon and near coral reef, to depth around 50m. Juveniles and small adults are commonly found in loose aggregation over seagrass beds, mangrove swamps and shallow sandy areas, while adults are generally solitary and found in deeper water. Although lethrinid fishes are one of the most important components of the artisanal fishery and wide spread in the Red Sea, knowledge on their biology and population dynamics on national and international levels is limited (Carpenter & Allen, 1989; Wassef, 1991; Mehanna, 1996, 1999 & 2011; Mohammed, 2007; Grandcourt *et al.*, 2011).

The present study aimed to provide the basic information required for the managing the redspot emperor *Lethrinus lentjan* in the Egyptian Red Sea, such as age and growth, mortality and exploitation rates, age at first capture, length-weight relationship and condition factor.

MATERIAL AND METHODS

Collection of Samples:

A total of 943 specimens of *L. lentjan* were monthly collected from the commercial catch of artisanal boats at different sites in the Red Sea (Al Tor, Suez, Hurghada; Shalateen and Abu Ramad) during the years 2014 and 2015 (Fig. 1). In the laboratory, samples were examined and the following data were recorded for each specimen: date of capture, total length to the nearest mm, standard length to the nearest mm, total weight to the nearest 0.1g.

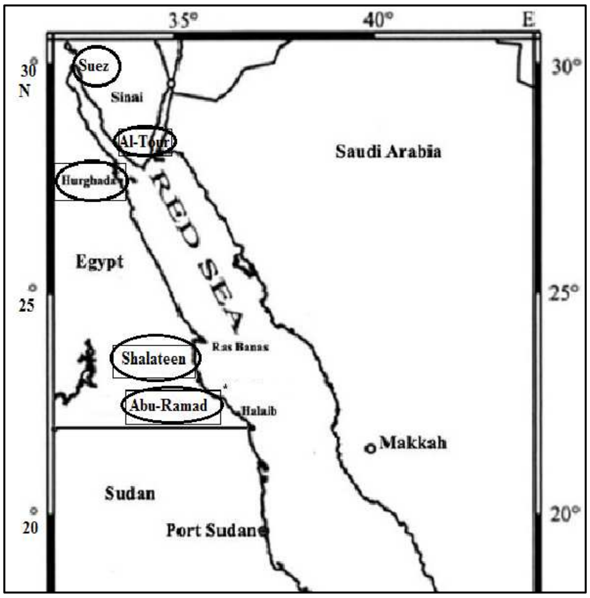

Fig. 1: Selected landing sites in the Egyptian coast of the Red Sea.

Scales were removed, cleaned and kept in special envelopes with full information for subsequent examination relevant to age determination.

Age determination:

Scales of *L. lentjan* were removed from the left side of each fish behind the pectoral fin. The scales were put in 10% solution of Ammonium hydroxide for 72 hours. Then, it was washed in distilled water, dried with filter paper and mounted between two glass slides. The annual growth rings were counted using a binocular microscope. Scale radius (R) and the radius of each annual growth ring (R_n) were measured to the nearest mm by scale projector. The relationship between scales radius (R) and total fish length (TL) was determined according to the formula TL = a + b (R). The back-calculated lengths at the end of each year of life were estimated by Lee's (1920) equation as follows:

$$L_n = (L_t - a) R_n / R + a$$

Where L_n is the length at the end of n years (mm), L_t is the total length at capture (mm), R_n is the scale radius to the n^{th} annulus (mm), R is the total scale radius (mm) and "a" is the intercept with Y-axis from the relationship of length and scale radius.

Length-weight relationship:

Length-weight relationship was determined according to the following equation:

$$W = aL^b$$

Where W = Weight of fish in g, L = Total length of the fish in cm and a & b are constants whose values are estimated by the least square method.

Condition factor

Condition factor (K_c) was calculated from the following equation (Le-Cren, 1951):

$$K_c = \frac{100\,W}{L^3}$$

While the relative condition factor (K_n) was determined as:

$$K_n = \frac{W}{W`}$$

Where W` = Calculated weight estimated from the length-weight relationship.

Growth parameters:

The von Bertalanffy growth model was applied to describe the theoretical growth of *L. microdon.* The constants of the von Bertalanffy model (L_∞ and K) were estimated by using Ford (1933)-Walford (1946) plot.

Length (L_c) and age (T_c) at first capture:

The length at first capture (the length at which 50% of the fish at that size are vulnerable to capture) was estimated by the analysis of catch curve using the method of Pauly (1984) and the corresponding age at first capture (T_c) was obtained by converting L_c to age using the von Bertalanffy growth equation as the follows:

$$T_c = -1/K \ln (1 - L_c / L_\infty) + t_o$$

Mortalities:

The total mortality coefficient (Z) was estimated as the mean of two different methods; linearized catch curve method of Pauly (1983) and cumulative catch curve of Jones and van Zalinge (1981), which based on frequency data. While, the natural mortality coefficient (M) was calculated as the geometric mean of three different methods; Taylor (1960), Ursin (1967) and Pauly (1980). Accordingly, the fishing mortality coefficient (F) was estimated by subtracting the value of natural mortality (M) coefficient from the value of total mortality coefficient (Z) as **F = Z - M**

Exploitation ratio (E):

The exploitation ratio or expectation of death from fishing during some specified period when all causes of death are affecting the population (Everhart *et al*., 1976) was calculated according to the relation **E = F / Z** (Gulland, 1971)

RESULTS AND DISCUSSION

Age determination and age composition

Age determination is one of the most important parameters in the field of fisheries management. It forms the basic knowledge required for the evaluation of longevity, growth rate, mortality rate and yield. These parameters are constituted the basic information needed for the construction of a management strategy for a rational exploitation of any exploited fish stocks (Mehanna, 1996).

The results showed that, *Lethrinius lentjan* in the Egyptian Red Sea attains 6 age groups in addition to zero one and the age group one is the most frequent group forming up to 54% of the total catch. The percentage occurrences of different age groups of this species are 10.60, 54.08, 16.12, 6.04, 5.30, 4.67 and 3.18 for 0, I, II, III, IV, V and VI groups, respectively (Fig. 2). This is an indication for over exploitation of this species.

About its age, Toor (1968) recorded 5 years in Indian water. Wassef (1991) and Mohammed (2007) recorded 7 years in Jeddah region, Saudi Arabia and Red Sea coast of Yemen respectively. Kedidi (1984) recorded 8 years in Saudi Arabia, Red Sea. Grandcourt *et al.* (2011) recorded 14 years in the southern Arabian Gulf. The maximum age that previously recorded for *L. lentjan* was 19 years in Great Barrier Reef (Grandcourt, 2002 and Currey *et al*., 2013).

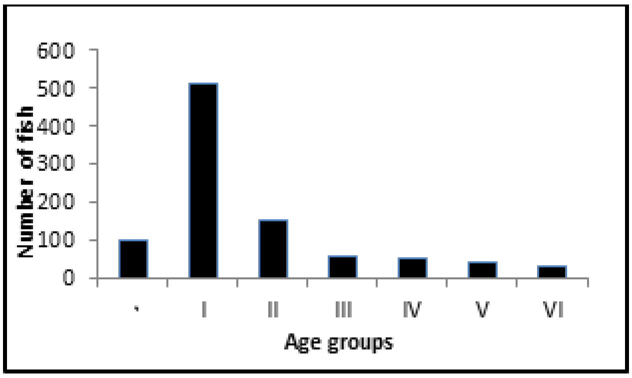

Fig. 2: Age composition of *L. lentjan* from the Egyptian Red Sea

Back-calculations:

Body length- scale radius relationship:

The length of *L. lentjan* samples varied from 11.5 cm to 50.7 cm in total length. The relationship beteen the body length – scale radius relationship is linear and not pass through the origin, and can be represented by the following equation (Fig. 3):

$$Y = 0.3607+0.8872\ X \qquad \text{With } R^2 = 0.9397$$

Growth in length and growth increment:

The back-calculated lengths at the end of each year of *L. lentjan* life were 24.45, 32.76, 38.45, 42.69, 46.19 and 49.11cm for the six years of life, respectively (Fig. 4). It is evident that *L. lentjan* attains its highest growth in length at the end of the first year of life (24.45 cm) after which the annual increment in length decreases gradually with further increase in age until reaches its minimum value (2.92 cm) at the end of the last year of life.

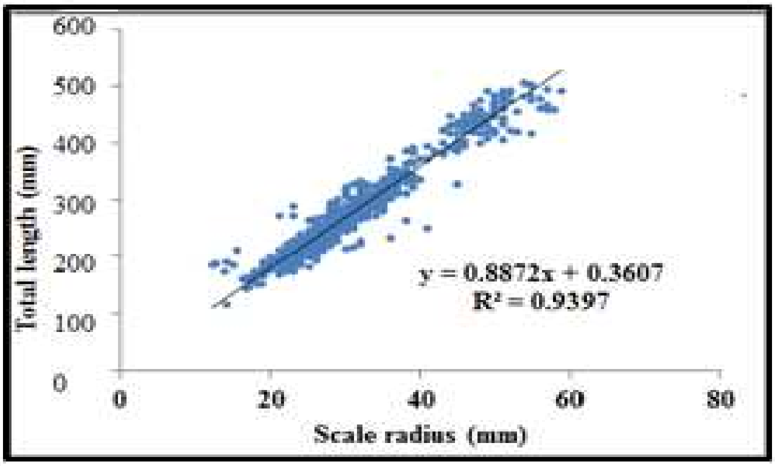

Fig. 3: Length- scale radius relationship of *L. lentjan* from the Egyptian Red Sea

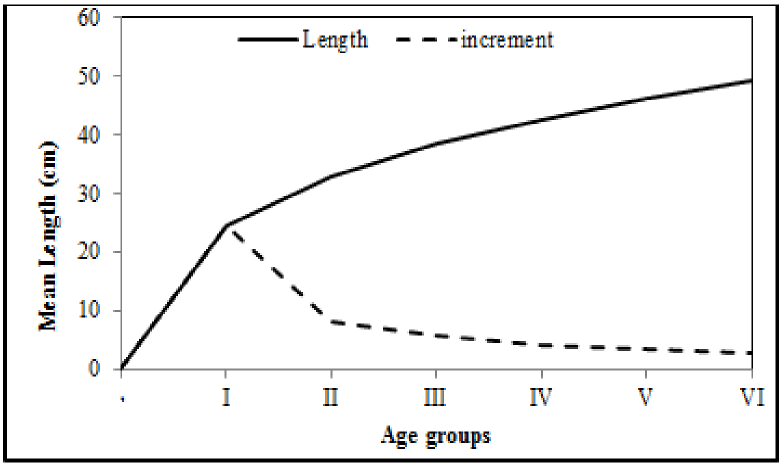

Fig. 4: Back -calculated length (cm) and growth increment at the end of each year of life of *L. lentjan* from the Egyptian Red Sea.

Length- weight relationship and growth in weight:

The length-weight relationship has a great importance in the first of fish biology and fisheries management. It is used for the calculation of the total yield of fish caught when the length and the number are known. It serves also in the conversion of the length to the weight or vice versa and the study of the variation in the expected weight for a length of fish as an indication of gonad development or fatness (Mehanna, 1996).

In the present study, the total length of *L. lentjan* ranged between 11.5 to 50.7 cm, while their total weights are varied between 20 and 1861 g. The obtained length-weight relationship equation (Fig. 5) was $W = 0.0127 L^{3.0338}$

It is clear that, "b" value is nearly equal to 3, indicating a tendency towards isometric growth. This result is in agreement with the findings of Kedidi (1984), who gave b-value at 3.09 and Wassef (1991) who estimated b at 2.99 in Saudi Arabia. While disagreed with the findings of Loubens (1980) in New Caledonia; Yanagawa (1994) in Thailand, Letourneur *et al.* (1998) in the southwestern Pacific Ocean, Mohammed (2007) in Red Sea coast of Yemen and Grandcourt *et al.* (2011) in the southern Arabian Gulf.

It is well known that, the length-weight relationship in fish can be affected by a number of factors including season, habitat, gonad maturity, sex, diet and stomach fullness, health and preservation techniques and differences in the length ranges of the specimens caught (Tesh, 1971; Wootton, 1998).

In the present study, the growth in weight at the end of each year of the life of *L. lentjan* was much slower in the first year of life and annual increment in weight increases with further increase in age unit reaches its maximum value at age group (III), after which a gradual decrease in annual increment was observed. This means that the redspot emperor should be protected until reach its third year of life.

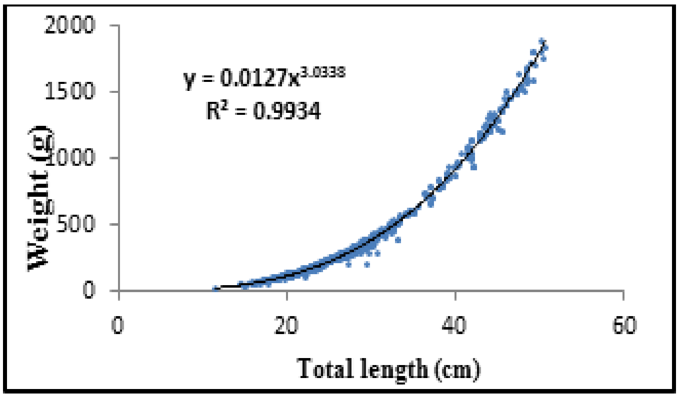

Fig. 5: Length-weight relationship of *L. lentjan* from the Egyptian Red Sea

Condition factor:

Data revealed that, the composite coefficient "k_c" and the relative condition factor "K_n" varied with the fish length groups. The maximum value of "k_c" (1.49±0.07) was recorded at the length group 13-14.9 cm TL and the minimum (1.32) occurred at the length group11-12.9 cm TL. While for $K_{n,}$ the maximum value (1.08±0.05) was recorded in the length group 13-14.9 cm TL and the minimum (0.96±0.09) occurred at the length groups 11-12.9 and 15-16.9 cm TL (Fig. 6).

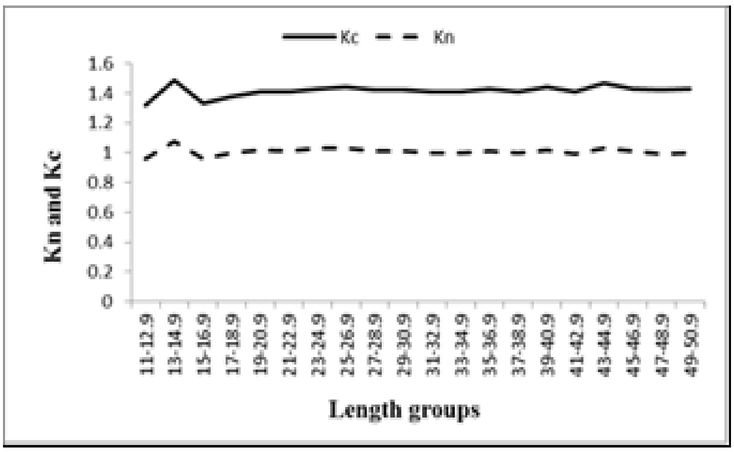

Fig. 6: Variation in condition factors (K_c & K_n) according to length groups of *L. lentjan* from the Egyptian Red Sea.

The monthly mean values of K_c and K_n were fluctuated (Fig. 7), where the highest value of K_c was recorded during April (1.84±0.25), and the lowest one was recorded during January and June (1.48±0.21). While, the maximum value of k_n was recorded during April (1.28±0.18), and the lowest was recorded during January (1.02±0.20).

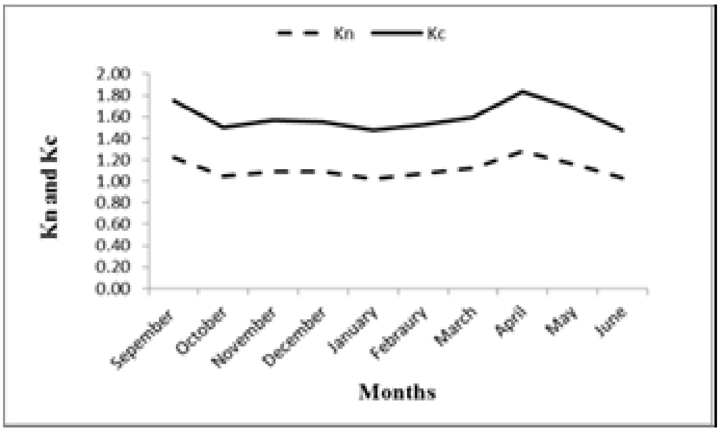

Fig. 7: Monthly variation in condition factor (K_c) and (K_n) of *L. lentjan* from the Egyptian Red Sea.

It is obvious that, the mean relative condition factor was nearly equal one, which indicates the suitability of the ecological conditions in the Egyptian Red Sea for the growth of *L. lentjan*. On the other hand, the values of standard deviations in the average weight were low for smaller fish and high for the larger ones. This may be due to the gonadal development.

Growth parameters:

The mathematical description of growth is of a great importance in the field of fisheries management and fish stock assessment. The obtained growth parameters (L_∞, K and t_o) are the basic input data into various models used for managing and accessing the status of the exploited fish stocks. Besides, the mathematical descriptions of the growth facilitate the comparison between growth of fishes belonging to different species or to the same species at different times and different localities. Several models have been developed for the mathematical description of growth, from which the von Bertalanffy growth model is the most widely used (Mehanna, 1996).

In the present study, the growth model of von Bertalanffy was applied to describe the theoretical growth of *L. lentjan* in the Egyptian Red Sea. The obtained L_∞ of *L. lentjan* (56.95 cm) was more or less in the range given by previous authors. Toor (1968) estimated L_∞ as 64.4 cm from Indian water, Kedidi (1984) gave L_∞ equal to 51 cm in Saudi Arabia, Wassef (1991) gave a lower one (49.4 cm) in Jeddah region, Saudi Arabia and Mohammed (2007) estimated L_∞ as 55.6 cm in Red Sea coast of Yemen.

On the other hand, the present growth coefficient value (K= 0.28/year) of *L. lentjan* was more or less similar to that recorded in the other studies; 0.27/year in Indian water (Toor, 1968), 0.29/year in Jeddah region, Saudi Arabia (Wassef, 1991).

Length and age at first capture L_C & T_C:

The length group frequency percentage of *L. lentjan* was cumulated separately and a cumulative curve was drawn to estimate the length at first capture L_c (Fig. 8). The length at first capture was found to be 20.11 cm and the corresponding age was equal to 0.58 year.

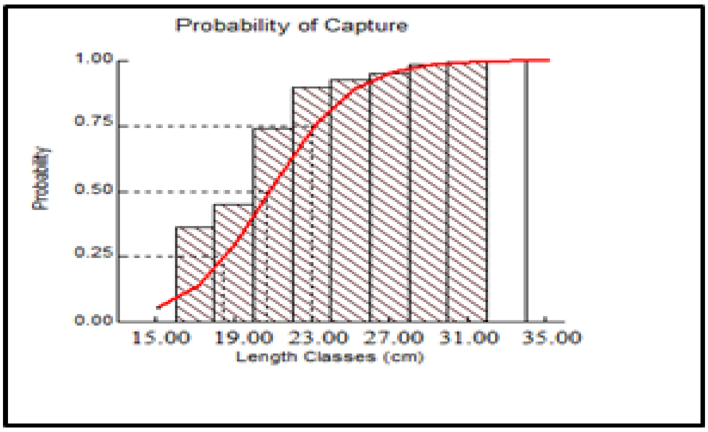

Fig. 8: Length at first capture of *L. lentjan* in the Egyptian Red Sea

Mortality and Exploitation ratio (E):

The mean total mortality coefficient (Z) of *L. lantjan* collected from Red sea during 2014 and 2015 was estimated at 1.52/year. While, the mean natural mortality coefficient (M) was calculated at 0.35/year. Correspondingly the fishing mortality coefficient (F) was 1.17/year.

The exploitation ratio (E) of *L. lantjan* collected from Red Sea was estimated at 0.77. In the present study, both of F and E were very high indicating an over exploitation situation. Gulland (1971) stated that the optimum level of exploitation was 0.5 when fishing mortality is equal to natural one and Pauly (1987) gave a less value for optimum exploitation level (0.4). So, the obtained value of E in the present study (0.77) is greatly higher than those given by Gulland (1971) and Pauly (1987) reflecting the high level of fishing pressure on this species. It could be concluded that the fishing effort should be reduced to conserve this fish resource as well as an analytical model should be applied to detect the optimum level of exploitation.

REFERENCES

Carpenter, K. E. and Allen, G. R. (1989). FAO Species catalogue. Emperor fishes and large-eye breams of the world (family Lethrinidae): An annotated and illustrated catalogue of lethrinid species known to date. FAO Species Synop. 125 (9).

Currey, L. M.; Williams, A. J.; Mapstone, B. D.; Davies, C. R. ; Carlos, G.; Welch, D. J.; Simpfendorfer, C. A.; Ballagh, A. C.; Penny, A. L.; Grandcourt, E. M.; Mapleston, A.; Wiebkin, A. S. and Bean, K. (2013). Comparative biology of tropical *Lethrinus* species (Lethrinidae): challenges for multi-species management. Journal of Fish Biology, 82: 764–788.

Everhart, W. H.; Eipper, A. W. and Yuoings, W. D. (1976). Principles of fishery science. Comstock Publ. Assoc.. Ithaca, N.Y., 288 pp.

Ford, E. (1933). An account of the herring investigations conducted at Plymouth during the years from 1924 to 1933. J. Mar. Biol. Assoc. U. K., 19: 305-384.

Ghisotti, A. (1995). The Red Sea. Casa Editrice Bonechi-Florence-Haly, 128 pp.

Grandcourt, E. M.; Abdessalaam, T. Z.; Francis, F. and Al Shamsi, A.T. (2011). Demographic parameters and status assessments of *Lutjanus ehrenbergii, Lethrinus lentjan*, *Plectorhinchus sordidus* and *Rhabdosargus sarba* in the southern Arabian Gulf. J. Appl. Ichthyol.: 1–9.

Grandcourt, E. M. (2002). Demographic characteristics of a selection of exploited reef fish from the Seychelles: preliminary study. Marine and Freshwater Research, 53: 123–130.

Gulland, J. A. (1971). The Fish Resources of the Ocean. West Byfleet, Surrey, Fishing News (Books), Ltd., for FAO: 255 pp.
Head, S. M. (1987). Introduction, in Key Environments Red Sea. Edwards, A. J. and Head, S. M. PP. 1-21. HRH the Duke of Edinburgh, International Union for Conservation of Nature and Natural Resources (IUCN).
Jones, R. and Van Zalinge, N. P. (1981). Estimates of mortality rate and population size for shrimp in Kuwait waters. Kuwait Bull. Mar. Sci., 2: 273-288.
Kedidi, S. M. (1984): Biology and stock assessment of the redspot emperor *Lethrinus lentjan* from water adjacent to Tuwwal. Saudi Arabia. FAO, RAB/81/002/15:21pp.
Le Cren, E. D. (1951). The length-weight relationship and seasonal cycle in gonad weight and condition in the perch (Perca fluviattilis). J. Anim. Ecol., 20: 201-219.
Lee, R. M. (1920). A review of the methods of the age and growth determination in fishes by means of scales. Fish, Invest. Ser., London, 2 4 (2): 1-32.
Letourneur, Y.; Kuibicki, M. and Labrosse, P. (1998). Length-weight relationships of fish from coral reefs of New Caledonia, Southwestern Pacific Ocean. An update. NAGA, 4: 39-46.
Loubens, G. (1980). Biologie de quelques espèces de poissons du lagon Néo-Calédonien. III. Croissance. Cah Indo-Pac., 2: 101–153.
Mehanna, S. F. (1996). A biological and dynamical study on fish population of *Lethrinus mahsena* in Gulf of Suez, Egypt. Ph.D. Thesis. Faculty of science. Zagazig University. Benha branch. Egypt.
Mehanna, S. F. (1999). An assessment and management of the coral reef fish stocks in the Gulf of Suez. Egypt. J. Aquat. Biol. & Fish., 3(2): 103-114.
Mehanna, S. F. (2005). Population dynamics of the areolate grouper *Epinephelus areolatus* from the Egyptian sector of Red Sea. 12th International Conference of Union of Arab Biologists, El-Hodeida University, Yemen, November, 2005.
Mehanna, S. F. (2011). population dynamic and management of snubnose emperor *Lethrinius bungus* (*L. borbonicus*) from the Foul Bay, Red Sea. International symposium. pp. 121-129.
Mehanna, S. F. and El-Gammal F. I. (2007). Gulf of Suez fisheries: current status, assessment and management. J. King Abdulaziz University, Mar. Sci., 18: 3-18.
Mohammed, M. A. (2007). Studies on the fish *Lethrinus Lentjan* (Lethrinidae) from artisanal fisheries on the Red Sea coast of Yemen. Ph.D. thesis, Suez Canal Univ. Faculty of Science. 300 pp.
Morcos, S. A. (1970). Physical and chemical oceanography of the Red Sea. Oceangr. Mar. Biol. Ann. Rev. 8: 73-202.
Pauly, D. (1980). On the interrelationships between natural mortality, growth parameters and mean environmental temperature in 175 fish stocks. J. Cons. CIEM, 39 (3): 175-192.
Pauly, D. (1983). Length-converted catch curves. A powerful tool for fisheries research in the tropics. Part1. ICLARM Fish Byte, 1(2): 9-13.
Pauly, D. (1984). Length-converted catch curves: a powerful tool for fisheries research in the tropics. Part. Fish Byte, 32(1): 17-19.
Pauly, D. (1987). A review of the ELEFAN system for analysis of length-frequency data in fish and aquatic invertebrates. ICLARM Conf. Proc., 13: 7-34.
Shiekh-Eldin, M. Y. (1988). Biological studies on certain Marine Teleosts, M. Sc. Thesis. Ain Shams University, Egypt.

Taylor, C. C. (1960). Temperature, growth and mortality – the Pacific cockle. J. Cons. CIEM, 26: 117-124.
Tesch, F. W. (1971). Age and growth. In: methods for assessment of fish Production In fresh waters. Ricke, W. E. (ed.). Blackwell Scientific Publications, Oxford: pp. 98-130.
Toor, H. S. (1968). Biology and fishery of the pig-face bream, *Lethrinus lentjan* Lacepede from Indian waters. Age and growth. Indian J. fisheries, 11(2): 597-620.
Ursin, E. (1967). A mathematical model of some aspects of fish growth, respiration and mortality. J. Fish. Res. Bd. Can., 24: 2355-2453.
Walford, L. A. (1946). A new graphic method of describing the growth of animals. Mar. Biol. Bull., 90(2): 141 – 147.
Wassef, E. A. (1991). Comparative growth studies on *Lethrinus lentjan*, Lacepede 1802 and *Lethrinus mahsena*, Forssk°al 1775 (Pisces, Lethrinidae) in the Red Sea. Fisheries Research, 11: 75–92.
Wootton, R. J. (1998). Feeding In: Wootton, R. J. (ed.). Ecology of Teleost Fishes, Kluwer, Academic Publishers, pp. 27–62.
Yanagawa, H. (1994). Length-weight relationships of Gulf of Thailand fishes. NAGA, 17: 48-52.

ARABIC SUMMARY

دراسة العمر ومعدلات النمو والنفوق لأسماك الامبراطور ذو النقطة الحمراء (*Lethrinus lentjan*) لتنظيم وإدارة مصايدها فى الساحل المصرى للبحر الاحمر

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تعتبر دراسة العمر وتعيين كلا من معدلات النمو والنفوق من المعايير الهامة والضرورية لتنظيم وإدارة المصايد وتحديد كيفية استغلالها الاستغلال الآمثل والمستدام. وفى هذه الدراسة تم تعيين العمر وحساب معدلات النمو والنفوق ومعدل الاستغلال لتقييم الوضع الحالى لمخزون اسماك الامبراطور ذو النقطة الحمراء (*Lethrinus lentjan*) فى القطاع المصرى للبحر الاحمر. واعتمدت الدراسة على إجمالى ٩٤٣ عينة تم جمعها خلال عامى ٢٠١٤ و ٢٠١٥ بطول كلى يتراوح من ١١.٥ سم الى ٥٠.٧ سم. وأوضحت النتائج أن اقصى عمر لهذا النوع فى الساحل المصرى للبحر الاحمر كان ٦ سنوات وكانت المجموعة العمرية الاولى هى الأكثر وفرة ممثلة ٥٤ % من المصيد الكلى لأسماك (*L. lentjan*) وبلغت معدلات النمو فى الطول أقصى قيمة لها مع نهاية السنة الاولى من العمر (٢٤.٤٥ سم) وانخفضت تدريجيا مع التقدم فى العمر حتى وصلت اقل قيمة لها فى اخر سنة من سنوات عمر السمكة. اظهرت قيمة (b = ٣.٠٣) فى دراسة علاقة الطول بالوزن أن معدلات النمو فى الوزن تتناسب مع معدلات النمو فى الطول. وبدراسة معامل الحالة (K_c) ومعامل الحالة النسبى (K_n) وجد انهما يختلفان تبعا لإختلاف الطول ومن شهر الى أخر. كما تم حساب الطول عند اول مصيد وكان ٢٠.١١ سم مقابلا لعمر يساوى ٠.٥٨ سنة . وكان معدل النفوق الكلى يساوى 1.52سنويا ومعدل النفوق الطبيعى= 0.35 سنويا ومعدل النفوق الناتج عن الصيد= 1.17 سنويا، وعليه تم حساب معدل الاستغلال وكان 0.77 . ومن هذه الدراسة يتضح ان كلا من معدلات النفوق الناتج عن الصيد ومعدل الاستغلال اعلى بكثير من القيم المثلى التى تحافظ على المخزون لهذا النوع فى المياه المصرية للبحر الاحمر.