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Fish populations in Lake Burullus, Egypt. I. Species composition in four fishing gears

M.T. HASHEM* and C.F.H. HOSNY**

* Institute of Oceanography and Fisheries, Kayet Bey, Alexandria (Egypt)
** Oceanography Department, Faculty of Science, Alexandria University, Alexandria (Egypt)

Introduction

Previously the species composition of Lake Burullus was studied by Libosvarsky et al. (1972), Libosvarsky and Darrag (1975). Hashem et al. (1973) studied the composition and abundance of mullets in the lake based on commercial and experimental catch data. The present study concerns a survey of fish species caught by four of the most common fishing gears used in Lake Burullus, namely Dora (fyke nets), Takem (Mullet trammelnets), Nasha (Tilapia trammelnets) and Gawabi (wire traps). The abundance of the commercial species in the catch per unit effort of each gear was calculated.

Material and Methods

Monthly samples were collected during the period from January to December 1987 using four types of fishing gears; Nasha, Balla, Dora and Gawabi. Catch per unit effort for Gawabi is the catch in weight of five units of traps with 18 mm mesh size set for 24 hours. CPUE of Nasha is 10 units joined together and set for 24 hours, each unit is 15 m long with mesh size of the inner layer ranging between 17 and 24 mesh bars per 50 cm. CPUE of Balla is 10 units, 15 m long with mesh size of the inner layer ranging between 26 and 32 mesh bar per 50 cm. CPUE of Dora is a 200 m long leader net, 35 mesh bar per 50 cm, set for 24 hours, combined with 6 fyke nets with mesh sizes ranging between 30 and 45 mesh bar per 50 cm.

Results and discussion

The ichthyofauna of Lake Burullus can be grouped into four major categories: tilapias, mullets, freshwater fishes and fishes of marine origin.

Altogether 29 fish species were identified in the catch of the four most commonly used gears of the lake. Mullets are represented by five species: Mugil cephalus, Liza ramada, L. saliens, L. aurata and Chelon labrosus. All seem to be indemic to the lake fauna, with the exception of L. aurata that was not included among mullets listed by Libosvarsky and Darrag (1975).

Freshwater fishes, other than tilapias, included 7 species, only three of which, i.e. Haplochromis desfontainesii, Bagrus bayad and Anguilla anguilla, have previous record in the lake. The other 4 species, i.e. Hemichromis bimaculatus, Clarias Lazera, Labeo niloticus and Dalophis imberbis, were only observed in the lake during the present study. It has to be mentioned that other species were recorded by Libosvarsky and Darrag (1975) and were not recorded during the present study. Their presence is uncertain, though not impossible, since they could have been missed by the 4 gears used during the present study.

Fishes of marine origin are temporarily present in the lake, especially in the area of the Lake-Sea connection. They do not contribute a considerable part in the fish population of the lake. Yet, it seems that at least four of them, i.e Dicentrarchus labrax, Solea vulgaris, Engraulis encrasicholus and Gobius sp., are consistant members of the ichthyofauna of the lake. However, there are other marine species that contribute much in the fish fauna of the lake, namely: D. punctata, Sciaena aquilla, Umbrina cirrosa and Crysophyris auratus, although not permanently represented in the catch.

Evidently, the list of fishes heretofore recorded mostly in the northern half of Lake Burullus is not exhaustive. Beyond doubt, more fish species, both marine and freshwater, could enter this part of the lake. However, the occurrence of other species recorded during the present study or in previous studies seem to be rare and sporadic.
In order to overcome the difficulties that may arise from this bias we will present the overall catch of the four gears as percentage average catch per unit effort as follows:

	Balla	Nasha	Dora	Gawabi	Average
Tilapia	17.31	88.31	8.99	73.64	47.07
Mullets	66.74	4.55	59.86	11.86	35.76
Marine	10.03	2.26	27.47	0.69	10.14
Freshwater	5.88	4.89	3.12	13.82	6.93

This shows that, tilapias constituted on the average 47.07% of the catch from Lake Burullus. The four tilapia species, although are more or less equally abundant, but tend to have the following order of abundance: T. zillii, O. aureus, S. galilaeus and O. niloticus.

On the other hand, mullets that constituted 35.76% of the total catch, were mostly represented by Liza ramada, that was the most abundant fish species constituting 27.7% of of the total catch of the four gears (77.4% of the mullet catch), followed by Mugil cephalus constituting 5.62% of the total catch (15.7% of the mullet catch). Among marine fishes, Solea vulgaris constituted 3.49%, followed by Crysophyris auratus (1.98%), Dicentrarchus punctata and D. labrax (constituting 1.6 and 1.54%, respectively). Among freshwater fishes, Clarias lazera was the most abundant in the catch of the four fishing gears (4.13%), while the rest of all freshwater fishes were less than 2%.

There are almost no data to compare our results with, except for the work of Libosvarsky and Darrag (1975) on Lake Burullus. However, their results were confined to four months only (January to April 1972). They have shown that, in the catch of fyke nets during that period, mullets, or rather Liza ramada constituted on the average 73.9%, while tilapias were only 5.3% of the catch.

References

Hashem, M.T., A.M. El-Maghraby and H.M. El-Sedfy 1973. The grey mullet fishery of Lake Borollus. Bull. Inst. Ocean. Fish., 3: 29-54.

Libosvarsky, J. and A.H.A. Darrag 1975. Fishing success and weather conditions in winter at Lake Borullus, A.R.E. Zool. Listy., 24(2): 175-184.

Libosvarsky, J., S. Lusk and H.M. El-Sedfy 1972. Fishery survey carried out at Lake Borullus, A.R.E., in the spring of 1971. Acta Sc. Nat. Brno, 6(7): 1-42.

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Fish populations in Lake Burullus, Egypt. II. Biology of Liza ramada in Lake Burullus, Egypt

C.F.H. HOSNY* and M.T. HASHEM**

* Oceanography Department, Faculty of Science, Alexandria University, Alexandria (Egypt)
** Institute of Oceanography and Fisheries, Kayet Bey, Alexandria (Egypt)

Introduction

The mullet population of Lake Burullus is composed of five species, viz: Mugil cephalus, Liza ramada, L. saliens, L. aurata and Chelon labrosus. Quantitatively, L. ramada constitutes 77% of the mullet population. The present study deals with the age composition, growth equations for length and weight, and estimates of rates of mortality in an attempt to throw light on the fisheries of this species in the lake.

Material and Methods

The present study was performed on 3835 individual of L. ramada caught from different areas of Lake Burullus. The sampling took place each month during the period from January to December 1987, using different fishing methods of various mesh sizes in order to cancel the effects of efficiency and selectivity of the fishing gears.

Random subsamples were taken each month for biological studies, during the whole period, a total of 497 fish, ranging between 80 and 350 mm in total length, were sampled. From each fish data on total length (measured to the nearest mm), total weight (weighed to the nearest gm), and scale samples were collected. Length weight relationship was computed according to the cubic relation $W=cL^3$. Length at age were computed from length distribution data (Gulland, 1983), and coefficients of total, natural and fishing mortalities as well as rate of exploitation were determined as given by Pauly (1984).

Results and Discussion

Age determination from scale readings revealed the presence of six age groups of L. ramada in Lake Burullus. Age length key constructed from these data were used for the transformation of the length frequency data of the 3835 collected fish into a length composition table from which the following mean lengths at ages were deduced: 12.87; 17.54; 23.09; 28.99; 32; and 34.67 cm, respective to age groups I to VI. These values are lower than those given for oter Egyptian waters, but are close to those given by Arne (1938) in the Gulf of Gascoyne, Ezzat (1965) in the etang de Berre. Moreover, Alebertini-Berhaut (1975), studying the growth rates of 0-age group of L. ramada in Marseille, found that it completes its first year of life at a length of 125 mm.

The percentage occurrance of each age group shows that among the six age groups represented in the catch, age group II constituted about 66%, followed by fishes of age group I (29.13%) and age group III (4.88%). Fishes older than 3 years constituted less than 0.5% of the population. Rafail (1968) analysing age composition of L. ramada, along the Egyptian coast of the Mediteranean Sea, found six age classes having the following relative frequencies: 55.6; 22.8; 10.4; 6.2; 2.9 and 2.1% (n=338) for respective age groups I to VI. Hashem et al. (1973) have shown that fishes of age group I constituted 84% of the population of L. ramada in Lake Burullus. This indicate that this age structure was the natural case for this species in the lake.

Linear growth of L. ramada in Lake Burullus was found to be expressed mathematically by the following equation:

$$l_t = 56.0366\ [1 - EXP(-0.1465(t+0.7455))]$$

The relation between total length (in cm) and total weight (in gram) for 497 individual of L. ramada ranging in length between 10 and 35 cm was found to be curvilinear and was expressed mathematically by the formula : $\log W = 3.0764 \log L - 2.2911$ (r=0.975)
The theoretical equation expressing growth in weight could thus be written as:

$$W_\infty = 1124.33\ [1 - EXP(-0.1465(t+0.7455))]^{3.0764}$$

Values of the exponent 'n' of the length-weight equation indicates that M. capito is in good conditions and that it grows heavier relative to its length in longer fishes. This value was higher than that given by various authors in other Egyptian waters and in the Mediterranean.

In a preliminary estimation of mortality rates exerted on L. ramada in the lake, using the Beverton and Holt equation the total mortality coefficient 'Z' was found to be equal to 0.6766. Meanwhile the natural mortality coefficient 'M' was computed using Pauly equation and was found to be equal to 0.5750. The fishing mortality coefficient was thus found to be equal to 0.1016. The rate of exploitation, or amount of death due to fishing, was found to be 0.0738. This figure indicates that the population of L. ramada is very weakly exploited, and that most of the mortality exerted on this population is due to natural causes. The age structure of the population of L. ramada indicates that fishes of age group I and younger are the most affected by this mortality. The length-weight relationships, on the other hand, showed that older age groups grow well under prevailing conditions in the lake. Whether these results reflect the actual state of the population of L. ramada in Lake Burullus needs more investigations.

References

Albertini-Berhaut, J. 1975. Biologie des stades juveniles de teleosteens Mugilidae Mugil auratus Risso 1810, Mugil capito Cuvier 1829 et Mugil saliens Risso 1810. III. Croissance lineaire et ponderal de Mugil capito dans le Golf de Marseille. Aquaculture, 5: 179-197.

Arne, P. 1938. Contribution a l'etude de la biologie des muges du Golfe de Gascogne. Rapp. Comm. Inter. Mer Medit., 11: 77-116.

Ezzat, A., 1965. Contribution a l'etude de la biologie de quelques Mugilidae de la region de l'etang de Berre et de Port de Bouc: These d'etat, Univ. Aix-Marseille.

Gulland, J.A. 1983. Fish stock assessment. A manual of basic methods. FAO/Wiley Series on Food and Agriculture. Vol. 1: 223p.

Hashem, M.T., A.M. El-Maghraby and H.M. El-Sedfy 1973. The grey mullet fishery of Lake Borollus. Bull. Inst. Ocean. Fish., 3: 29-54.

Pauly, D. 1984. Recent developments in the methodology available for the assessment of exploited fish stocks of reservoires. In. Status of African reservoir fisheries. CIFA Tech. Pap., 10: 326p. edited by Kapetsky, J.M. and T. Petr.

Rafail, S.Z. 1968. Investigations of mullet fisheries by beach seine on the U.A.R. Mediterranean coast. Stud. Rev. gen. Fish. Coun. Medit., 35: 1-19.