Journal of American Science

Websites:
http://www.jofamericanscience.org
http://www.sciencepub.net

Emails:
editor@sciencepub.net
sciencepub@gmail.com

MARSLAND PRESS
Multidisciplinary Academic Journal Publisher

Economic Study of Fish Production in Lake Maryot

Dr. Fatma Elzahraa Ahmed Gerbil[1], Dr. Yasmeen Mousa Abo Elyazeed Mousa[1] and Dr. Zainab Mohktar Kolib[2]

[1]Agricultural Economics Research Institute - Agricultural Research Center, Egypt
[2]National Institute of Oceanography Fisheries (NIOF), Egypt
Email: drfatmagebril@gmail.com

Abstract: The problem with research was the instability of fish production in Lake Maryot, especially during the period (2015- 2019), Although the lake has been developed by the Public Authority for the Development of Fisheries, Fish production peaked at about 12.30 thousand tons in 2015, an estimated 65% increase over 2014. The following years, however, it declined by between 15% and 35%. In the context of the research problem, the research aimed at: (1) Study of the evolution of fish production from Lake Maryot during the period (2005-2019), (2) Study of the current status and productivity of fishing units on Lake Maryot, (3) estimating the optimal production of fish in Lake Maryot, (4) estimate of seasonal evidence of fluctuations in fish production from Lake Maryot ott fisheries, and (5) identification of the main impediments to the development of fish production on Lake Ma Maryot in order to establish procedures and measures to address and overcome them. The research produced a series of findings, the most important of which were: The increase in 2015 was due to an increase in water levels during this year as a result of development and clean-up work in 2014, as well as a reduction in production in the following years as a result of a reduction in water levels by about 30 cm in November 2015, The period from 2015 to 2019 was also found to have seen a marked improvement in the productivity of the fishing units used on the lake, and fish production on the lake was found to take place in the third non-economic stage of the production function. By applying the Cipher surplus model to Lake Maryot catches, maximum sustainable production was estimated (MSY) about 8,478 thousand tons/year, using optimal effort (F_{max}) Estimated at 808 compounds, comparing the estimated production of the model with actual production shows that actual production exceeded the permitted production in 2015, 2016, 2017 and 2019 using a higher than optimal fishing effort Based on the study of seasonal fluctuations in production, average seasonal fish production exceeds the overall average of about 808.18 tons during the spring and summer, While falling through in winter and autumn, With an estimated seasonal ratio of 98.82% and 91%, respectively, and the seasonal coefficient was about 1.13, Examination of the constraints to the development of Lake Maryot's fisheries shows that the most significant among them are pollution of the lake's waters as a result of various sources of wastewater (industrial, sanitary and agricultural), the lake's exposure to drying and Backlogs, and overfishing.

[Fatma Elzahraa Ahmed Gerbil, Yasmen Mousa Abo Elyazeed Mousa and Zainab Mohktar Kolib. **Economic Study of Fish Production in Lake Maryot** *J Am Sci* 2022;18(1):35-43]. ISSN 1545-1003 (print); ISSN 2375-7264 (online). http://www.jofamericanscience.org. 4. doi:10.7537/marsjas180122.04.

Key words: Lake Maryot - overfishing - overproduction model - Schaefer

Introduction:

Fish production is an economic activity that contributes to the development of national income. as well as Fish are important sources of food for humans that can contribute to bridging part of the food gap of animal protein in Egypt, because they contain a large proportion of animal protein up to more than 20% and contain a large proportion of vitamins, salts and minerals. In addition to containing a high proportion of essential amino acids required for the body, the fish protein is easily digested, absorbed and representative compared to the protein in red meat، this is in addition to containing a high proportion of essential amino acids required for the body.

The sources of fish production in Alexandria Province are numerous between the natural fisheries of the Mediterranean Sea and Lake Maryot's and the different patterns of fish farming, with total fish production from these sources during the period (2015-2019) About 3.68, 9.7, 8.75 thousand tons each, respectively[(9)] Lake Maryot's accounts for about 43.8% of the total fish production in Alexandria during the same period, thus being the largest source of fish production in the province, followed by fish farming, where fish production is about 39.5%, and Mediterranean fisheries, where it accounts for about 16.6% of the total production in the province[(9)].

Lake Maryot is one of the northern lakes (elmanzla-Burlos-Adku-Maryot), It contributes about

9.7 thousand tons per year during the period (2015-2019), That's about 6.6% of the total fish production in the northern lakes of about 1465,9 tons during the same period, So Maryot Lake ranks third of terms contribution to fish production, after Lake Burlos and elmanzla, that fish production is about 70,9 thousand tons and 59.6 thousand tons, contributing about 48.3% and 40.6% of the total fish production from the Northern Lakes, respectively[9].

Research problem:

The problem with research was the instability of fish production in Lake Maryot, especially during the period (2015- 2019), Although the lake has been developed by the Public Authority for the Development of Fisheries, Fish production peaked at about 12.30 thousand tons in 2015, an estimated 65% increase over 2014. the following years, however, it declined by between 15% and 35% - Table (1), so it is necessary to identify the productive situation on the lake and the problems and constraints it faces in developing the necessary procedures and mechanisms to cope with and overcome them.

Search Objectives:

In the light of the research problem, the objectives of the research have been defined as follows:

1. Study of the evolution of fish production from Lake Maryot during the period (2005 - 2019).
2. 2- Study of the current status of fishing units and their productivity on Lake Maryout.
3. Estimate the optimal production volume of fish in Lake Maryout.
4. Estimate the seasonal evidence of fluctuations in fish production from Lake Meriott fisheries.
5. To identify the main obstacles to the development of fish production on Lake Maryot in order to establish measures to address and overcome them.

Research Method:

In this research, several research methods were used to achieve the desired objectives: descriptive economic analysis to describe and explain variables, in addition to the standard statistical and economic analysis method, where the rates of change for the economic variables studied were estimated using the growth function.

The simple regression model of the Lake Maryot fish production estimate (Yt) was also estimated as a function of the number of fishing boats as a productive element (Ft) during the period (2005- 2019), in the double logarithmic form by including the autoregression, where the estimate in the following form:

$$\text{Ln } Y_t = \text{Ln } C - b_1 \text{ Ln } F_t + b_2 \text{ AR}(1)$$

A series of statistical tests has also been carried out to ensure that the estimated regression models are free of the standard problems with their residuals. The existence of the autocorrelation of the residuals was revealed using the graphic signature of the correlation coefficients (correllegram), and the use of the Jarcu-Pera test to detect the normal distribution with the residuals, The White test was also To ascertain the homogeneity of the variation in the regression model residuals of the regression model.

Optimal fish production in Lake Maryot fisheries has also been estimated using the overproduction model (Schaefer), which relies on the productivity of the fishing unit (Y/F) as a function in the fishing effort (F) to estimate the maximum permitted fishing rate (MSY), where the estimate is as follows:

$$Y/F = a + b F$$

Where that: Y/F = productivity of the fishing unit

Y = the fish production (Catch) of the fish supplier in question.

F = Fishing Effort estimated by number of fishing units, a, b constants

The fishing effort leading to maximum sustainable production (F_{max}) is estimated from the following relationship:

$$F_{max} = -a/2b$$

while an estimate is made Maximum Sustainable Yield from the following relationship:

$$MSY = -a^2/4b$$

The statistical estimate of the fish production season on Lake Marriott is based on the calculation of average phenomenon values for each quarter, followed by the calculation of the overall average for all mean quarters, and then the division of each quarter by average averages, producing seasonal indicators for each quarter.

Data sources:

The research was based on published and unpublished secondary data from government agencies such as the General Fisheries Development Authority, the Central Bureau of Public Mobilization and Statistics, the Institute of Marine and Fisheries Sciences, and references and research on the subject. Preliminary data obtained from a personal interview with some fishermen in Lake Maryot were also used.

Research Results:

Firstly: Study of the evolution of fish production from Lake Maryou

Lake Maryout is the smallest of the northern lakes, It's a closed lake with sewage, It's about 14.5 thousand acres, This lake is highly fertile, It also has a high capacity for organic production, Which makes it a typical fish farm, However, their water is exposed to pollution caused by the pouring of plant and sewer residues and agricultural drainage loaded with chemicals, The Hunters in the lake practice fishing trades such as guabs, dabbas and neshsha.

The lake consists of four basins: The 6,500-acre basin, which is the main basin, the northwest basin, currently has an area of about 3,300 acres, and the

fishing basin (Fish Farm), called the 10000-acre basin, is considered to be a non-polluting basin, the southwest basin and the western basin, each with an area of 5,500 acres and 200 acres, respectively.

The following is a study of the evolution of total fish production on Lake Maryot during the period (2005 – 2019):

By studying the data contained in table (1) and studying the evolution of fish production from Lake Meriott during the period (2005-2019) It was found to have ranged from a minimum of about 4.35.000 tons in 2008 to a maximum of about 12.30.0 tons in 2015, with an annual average of about 7.14.000 tons.

It should be noted that the sudden increase in the amount of fish production on the lake in 2015 is due to the increase in water levels during this year as a result of the development and purification work carried out in 2014 with the removal of a large part of the grass and bowls that impede the fishing process and are considered to compete with the fish on the water and the appropriate rise of the water table leads to the availability of micro-nutrients for fish, In addition to supplying fish to the lake, especially in the 100-acre basin, which was used as a fish farm, which led to an increase in fish production at the lake in 2015, the increase in production was estimated to be between 62% and 182% years earlier.

It should also be noted that production declined again in the years following 2015 due to the reduction of water levels by about 30 cm because of precautionary measure Adopted by the Ministry of Irrigation and Water Resources in November 2015, which has led the water to stagnate and Death of fish and juvenile fish. owing their exposure for inappropriate environmental factors, as well as Impeding boats from engaging in productive activity, Until it reached its minimum.in 2018-Table (2).

It should also be noted that production declined again in the years following 2015 due to the reduction of water levels by about 30 cm because of precautionary measure Adopted by the Ministry of Irrigation and Water Resources in November 2015, which has led the water to stagnate and Death of fish and juvenile fish. owing their exposure for inappropriate environmental factors, as well as Impeding boats from engaging in productive activity, Until it reached its minimum.in 2018-Table(2).

Table (1): Development of Lake Meriott fish production and its relative importance in fish production in the province of Alexandria and the Northern Lakes during the period (2005-2019).

Year	Total fish production in the northern lakes (thousand tons)	Total fish production in the province (thousand tons(	Lake Maryot		
			Amount of fish production	Relative importance in total conservation in the Northern Lakes (%)	Relative importance in overall conservation (%)
2005	108,70	22,47	5,29	4,87	23,54
2006	108,30	25,15	5,21	4,81	20,71
2007	106,10	22,94	4,41	4,16	19,23
2008	109,00	25,62	4,35	3,99	16,98
2009	113,10	22,22	5,52	4,88	24,84
2010	133,01	25,64	5,92	4,45	23,09
2011	117,14	25,19	5,43	4,63	21,54
2012	128,35	25,01	7,43	5,79	29,70
2013	144,87	22,23	7,64	5,27	34,35
2014	132,32	20,16	7,46	5,64	37,02
2015	132,63	21,57	12,30	9,27	57,03
2016	123,53	20,80	8,56	6,93	41,15
2017	146,19	22,11	9,12	6,24	41,26
2018	152,55	20,46	8,06	5,28	39,38
2019	179,64	25,68	10,45	5,82	40,70
average	129.03	23.15	7.14	5.34^{+}	29.57^{+}
rate of change (%)	-	$-0.7^{n.s}$	6^{**}	3.1^{**}	6.8^{**}

** statistically significant at . Level (0.01) $^{n.s}$ nonsignificant $^{+}$ Represents geometric mean.

Source- Collected and calculated from: Ministry of Agriculture and Land Reclamation, General Fisheries Development Authority, Annual Fish Statistics Book, Cairo, Discrete Numbers.

The data in table (1) showed that Lake Maryot contributes about 5.3% to the amount of fish production from the northern lakes in the average study period, The fish contribution of the lake in the Northern Lakes was also found to range from a minimum of about 3.99% in 2008 to a maximum of about 9.27% in 2015, And it's increasing at an annual rate of about 3 %.

The lake was also found to contribute about 29.6% of the total fish production in Alexandria province to the average study period [9] Considering the evolution of the relative importance of the amount of fish produced from the lake in overall production in the province was the lowest by about 16.98 per cent in 2008, while the highest by about 57.03 per cent in 2015, This proportion has been shown to increase at an annual rate of about 6.8%, This illustrates the particular importance of Lake Maryot, especially in view of the continuous and significant decline in Mediterranean fisheries, estimated at 15.9%, 9 which requires increased attention to the lake's fisheries to ensure its continued role in increasing fisheries production in the province.

Second: Study of the current status and productivity of fishing units in Lake Maryot

It should be noted that Lake Maryot fishing is carried out using third-class sailboats (Sombuk-Faloca), the examination of the data in table (2) shows:

(1) By studying the evolution of fishing units on Lake Maryot during the period (2005 - 2019), Found that they ranged from a minimum of about 581 fishing vessels in 2018 to a maximum of about 1482 in 2007, An annual average of 994 fishing vessels, The number of fishing units used in Lake Maryot has tended to decrease at an annual rate of about 3.2% during the study period,

It should be noted that the number of boats decreased by about 27% in 2018 compared with the previous year, reaching the lowest number of fishing vessels on the lake, This is due to the fact that the continued reduction of water levels and the drying up of the lake by the Ministry of Irrigation has hampered the movement of boats and reduced production beginning in 2016, This led to the reluctance of fishermen to obtain a fishing permit, which was reflected in the number of vessels engaged in fishing activities on the lake.

(2) A study on the evolution of the productivity of Lake Marriott's fishing unit showed that it ranges from at least 2.98 tons/ boat per 2007, about 13.87 tons/ boat per 2018, with an annual average of about 7.74 tons/ boat, the productivity of the fishing units used in Lake Mariot tends to increase at an annual rate of about 9 tons, and during the study period the productivity of the fishing unit improved markedly from 2015 to 2019.

(3) Estimated The simple regression model of the expression of fish production in Lake Maryot (Y_t) As a function in the number of fishing boats as a productive element (F_t) During the period (2005-2019), This is after the data has been stored and the problem of self-correlation has been eliminated by including the self-regression of the regression model in the double logarithmic image, which can be illustrated by the following equation:

$$\begin{array}{l} \text{Ln } Y_t = \text{Ln } 0.387 - 0.803 \text{ Ln } F_t + 0.864 \text{ AR}(1) \\ (27.009)^{**} \quad (-2.420)^{*} \quad (4.960)^{**} \\ R^2 = 0.31 \qquad\qquad F = (5.856)^{*} \end{array}$$

The state of natural distribution and the homogeneity variance of the residuals of the previous regression model have been confirmed by the required statistical tests and have therefore been adopted to obtain regression results with the other factors stability.

Table (2): Fish production, fishing effort and the fishing unitn productivity of the Lake Mariot during the period (2005-2019)

Year	Fish production (Y) (ton)	Fishing effort (F) (Fishing Unit)	Fishing unitn productivity(Y/F) (boat / Ton)
2005	5290	987	5,36
2006	5210	990	5,26
2007	4410	1482	2,98
2008	4350	1128	3,86
2009	5520	1086	5,08
2010	5920	1181	5,01
2011	5427	1145	4,74
2012	7427	1038	7,16
2013	7636	845	9,04
2014	7463	843	8,85
2015	12301	1013	12,14
2016	8651	815	10,61
2017	9120	795	11,47
2018	8058	581	13,87
2019	10451	977	10,70
average	7148,93	994	7,74
Rate of change (%)	6,0**	-3,2**	9,2**

** statistically significant at . Level (0.01 (

Source- Collected and calculated from: Ministry of Agriculture and Land Reclamation, General Fisheries Development Authority, Annual Fish Statistics Book, Cairo, Discrete Numbers.

This model shows the inverse relationship between the number of fishing boats and the production of fish, By increasing the number of fishing boats by about 10% annually, fish production has declined by about 8.03%, Which means that lake fish production takes place in the third, uneconomical phase of the production function, This requires all actions that control the number of fishing boats or the actual fishing effort. To the extent that production continues to increase while maintaining the biological fish stock on the lake, This requires estimating the optimal size of the fishing effort leading to the optimal volume of fish production from Lake Maryot fisheries in a manner that keeps the fish stock from draining.

Third: Estimate the optimal size of fish production from Lake Maryot fisheries

It is known that the increase in production over the permitted level of fishing necessarily results in a reduction in the amount caught in the following seasons, even as the level of fishing efforts remains constant, The fishing process must therefore be balanced with the ability of the fish supplier to recover its elements and fish stocks, It is therefore necessary to estimate the volume of production and the optimal effort that keeps the fish resource from being drained, Hence the recovery of the fish resource.

Therefore, the Schaeffer model was used to estimate the optimal size of fish production that protects the fish resource from depletion, This model is considered to be one of the most appropriate estimates of fishing rates for Egyptian database conditions, The assessment of this model is aimed at: (1) conservation of natural fish resource, (2) determining optimal production quantities under current fisheries conditions; and (3) determine the appropriate number of fishing units that keep the fish resource from draining.

And by applying the overproduction model (Schaeffer) On Lake Maryot's catches during the study period As a function relationship between boat productivity (Y/F) and boat numbers (F) It turns out that optimal biological production or maximum sustainable production (MSY) This amount was estimated at 8,478 thousand tons per year, using an optimal voltage (F_{max}) of about 808 boats-Table 3).

Table (3): Estimate of maximum sustainable production according to the Schaeffer model for Lake Marot fish production during (2005-2019)

Surplus production model	Maximum Sustainable production (MSY)	Fishing effort leading to maximum sustainable production (F_{max})	Actual production *(ton)
Y/F = 20,997 - 0,013 F = $(7.859)^{**}$ $(-5.063)^{**}$ R^2= 0.66 F = $(25.629)^{**}$	8478.4	808	**8651**

(*) Concluded from relationship:
(Fishing effort leading to maximum production * actual production in 2016) /Number of boats used in 2016.
Source- Collected and calculated from: Using the surplus production model for the data in table (2).

Comparing the estimated amount of production from the model with the actual amount of production shows that actual production exceeded the permitted amount of production in 2015, 2016, 2017 and 2019, Production was about 12.30, 8.65, 9.12 and 10.45 thousand tons each, respectively. This production was obtained with a higher than optimal fishing effort of about 1013, 815 and 977 fishing vessels in 2015, 2016 and 2019, The lower than optimal fishing effort was about 795 fishing boats during 2017, showing that there was an overfishing on Lake Maryot in the said four years.

Fourth: Seasonal fluctuations in fish production in Lake Maryot

The fish production sector is characterized by seasonal fluctuations because it is a biological production based on organisms living in climate conditions that are not stable throughout the year, In addition to the diversity of fish in terms of Whereabouts, dates of reproduction, availability of food, and the extent to which they respond to different environmental changes.

This require for the study of seasonal production fluctuations in the catches of Lake Maryot during the period (2015 - 2019), They show that their fish production is stable during the seasons of the year, However, some seasons of the year have more production than others, but in small proportions, This can be explained as follows:

Table (4): Seasonal production fluctuations of catches from Lake Meryot during the period (2015-2019).

Seasons of the Year	months	Average Monthly (ton).	Seasonal (Average (ton)	%Seasonal Volatility	Seasonal coefficient
Winter	January	809,2	798.67	98.82	1.13
	February	742,4			
	Mars	844,4			
Spring	April	870,8	855,27	105.83	
	May	870,8			
	Ionic	824,2			
Summer	Yuli	901,2	819,80	101.44	
	August,	819,8			
	September	738,4			
Autumn	October	862,4	759,00	93.91	
	November	731,8			
	December	682,8			
overall average		808,18	808,18	100	

Seasonal coefficient = Seasonal Average/ overall average.
Seasonal coefficient= Highest Seasonal Average / Lowest seasonal average.
Source- Collected and calculated from: Ministry of Agriculture and Land Reclamation, General Fisheries Development Authority, Annual Fish Statistics Book, Cairo, Discrete Numbers.

The average seasonal fish production from Lake Maryot catches exceeds the overall average of about 808.18 tons during the spring and summer with an estimated seasonal evidence of 105.83% and 101.44% respectively, The seasonal average is lower than the overall average during the winter and autumn periods by an estimated 98.82% and 93.91% respectivel- table (4).

The lower seasonal average is due in the autumn for the rest of the season Lack of activity and difficulty in fishing, higher than the seasonal average for spring and summer for seasonal average for the rest of the seasons To be actual fishing months where the fisherman stays for long periods in fishing activity – table (4).

Fifth: Obstacles to the development of the fisheries in Lake Maryot

The lake has been severely neglected, and precautionary measures by the Ministry of Irrigation to prevent a recurrence of drowning have reduced the water level and dried up the limbs, threatening its fisheries, As part of this research, the main constraints to the development of fish production on Lake Meriott have been identified through interviews with fishermen and can be identified as follows:

(1) Polluting lake water As a result of the high incidence of waste water from different sources(industrial, health and agricultural), The lake is still exposed to industrial drainage without treatment by :Petrochemical Company, Salt and Soda Company, Spinning and Textile Company, It also suffers from untreated sewage from German project drainage plants, Mubarak drainage plant and Western Purification drainage plant.

This has resulted in water quality and natural imbalance being affected as a result of its direct impact on microorganisms that mark the beginning of the first fish food chain and hence its direct impact on fish and the accumulation of pollutants to store heavy elements in their muscles, damaging both consumers and fishermen.

One of the effects of pollution is also The disappearance of marine species of high economic value such as dennis, karos and purée family as a result of a change in the chemical characteristics of water that does not match the livelihood of this species and the sovereignty of other low-economic value species, such as tilapia and kramet.

(2) The lake was exposed to drying and backfilling, which led to a contraction of about 14.5 thousand acres. Since 1986 Lake Merriot has been drying up either by official and government authorities or by individuals, owing to the lack of accurate and up-to-date data on the uses and geographical boundaries of the land around the lake, which encourages continued encroachment on the lake's campus.

Some 500 acres were cut by the Prime Minister's decision to establish Mubarak Sports City, some 200 acres for the construction of Sector VII of the Northern Coastal International Route, about 130 acres for the creation of the International Park, and about 40 acres for the expansion of the Alexandria County Sanitation Project.

That's in addition to attempts by some individuals or companies to deduct Some parts of the lake are seized This is done by exploiting the lack of water levels in the lake, which facilitates the process of blocking and handcuffing areas, encroachments on the lake amounted to 850 cases of construction of buildings and nests, Despite coordination between the Ministry of the Interior, the Province of Alexandria and the Northern Command to remove such encroachments; However, only 400 cases were removed as part of the Lake Maryot development as of September 2019, and encroachments remained in the 5,500-acre basin.

(3) Overfishing using illegal methods such as illegal trawling Having a negative impact on the decline and depletion of fish stocks, as well as Increase in the numbers of fishing units above the number of licensed units and the numbers of fishermen, Research has found a reverse relationship between production and boat numbers (fishing effort), and the presence of overfishing during the years 2015, 2016, 2017, and 2019.

Sixth: Mechanisms for the development of fisheries production in Lake Maryot

In order to develop the natural fisheries production on Lake Maryot, the research suggests the following actions and measures:

(1) To continue to implement the Plan for the Development and Development of Lake Maryot, within the State Strategy for the Development of the Northern Lakes, This is the first time that Lake Maryot has seen development work to deepen and raise the water level of the lake in several years, For the first time, the crickets arrive at the lake to deepen and raise the ratio to 1.5 meters:

(a) To deepen the lake and raise its water level to about 1.5 meters, leading to the disappearance of limb dehydration; Thus maintaining the rise of the water level throughout the day of the year, As well as keeping water coming from the castle bank inside the lake.
(b) Removal of grass and bowls as well as benthic sediments.
(c) Remove encroachment on the lake in its various forms.

(2) Attention to improving water quality through the project to isolate the Drain of alemoom from the lake, to create bridges and gates to control water entering the lake and to combat pollution of various kinds (industrial, health and agricultural), by:
(a) **Combat industrial wastewater pollution** by requiring plants whose waste is dumped directly or indirectly to treat their own wastewater prior to discharge into the lake.
(b) **Control of sewage pollution**: by separating the sewage system from industrial sewage and by purifying it from impurities, pollutants, stuck substances and organic matter to be disposable in waterways without causing pollution;
(c) **Pollution by agricultural wastewater**: Pollution by agricultural wastewater: Its adverse effects can be reduced by the trend towards the use of environmentally friendly organic fertilizers in agriculture, the reduction of reliance on chemical fertilizers and agricultural pesticides and the activation of the role of the Ministry of Agriculture in accordance with article 10 of Act No. 48 of 1982 on the protection of the Nile River and waterways from pollution.

(3) Promote an optimal fishing effort of about 8,478 thousand tons to maintain the fish stock on the lake, Therefore, the actual fishing effort must be reduced to the optimal estimated effort of 808 boat to maximize sustainable production, Since it is not possible to reduce the number of fishing boats operating in Lake Maryot, the following actions can be taken to address this problem:
(a) Review the fishing licences operating at Lake Maryot and issue no new licences and take all necessary legal measures to implement them.
(b) Resisting illegal fishing methods by activating the role of the Water Bodies Police.

Conclusion:

Lake Maryot suffers from many problems and constraints that prevent the development of its fish production and the preservation of its fish stock, The research therefore recommended a number of mechanisms to address these constraints, including To continue to implement the Plan for the Development of Lake Maryot, as part of the State's strategy for the development of the Northern Lakes, with a view to improving the quality of water, and to promote the optimal fishing effort that has been achieved.

Reference

1) Abd-El Hafez , S,M – An Economic Study on Present Situation of Mariut Lake Fisheries - Workshop on Lake Mariut Pollution Problems and Proposals for Restoration and Better Management – Alex- April – (27-30) -1994 ,
2) Abdul Qadir Mohamed Abdul Qadir Attiya, Talk in Econometrics between Theory and Practice, 2nd edition, June 2004.
3) Amal Eskander Phelps - "the most important biological studies Alsichled fish (Bolti) in the marine Nozha Airport Alexandria - Egypt", Master Thesis, Department of Marine Sciences, Faculty of Science (Benha), Zagazig University, 2004
4) Amira Jaber Mohamed , Analytical Economics Study of Egyptian Red Sea Fisheries, Master's thesis, Department of Economics and Agribusiness, Faculty of Agriculture University of Alexandria, 2017.
5) Asmaa Mohsen Badir elkersh, contemporary geomorphological changes in the Lake Maryot region and their impact on human activities using GIS and remote sensing, Faculty of Arts, University of Alexandria (2013).
6) Ministry of Agriculture and Land Reclamation, General Authority for Fisheries Development, Annual Fish Statistics Book, Cairo, Miscellaneous Issues.
7) Mohamed Mustafa Abdel Ati, Said Mohamed Abdel Hafid - Economic Study of Fish Production in the Province of Alexandria, Alexandria Journal of Scientific Exchange, volume 33.
8) Neamma Hussein Saleem on Saleem, Sustainable Development of Lake Mariot using Remote Sensing and GIS Techniques, (2017).
9) Saeed Mohamed Abdel-Hafid (and others), Economic and Social Study of the Fisheries and Development of Lake Maryot, Economics and Fisheries Statistics Laboratory, Fisheries

Division, National Institute of Marine and Fisheries Sciences, 2017-2018.
10) Saeed Mohamed Abdel-Hafid and others, Economic Study on the Fisheries and Development of the Egyptian Lakes , Journal of the Arab Water Farming Society, Volume (10), Issue (2), December 2015.
11) The Central Bureau of Public Mobilization and Statistics, Statistics of fish production in the Arab Republic of Egypt, Cairo, various numbers.

1/17/2022