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Reproductive Biology of Crucian carp (*Carassius carassius*) in Melka-Wakena Reservoir, Ethiopia

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ABSTRACT

Reproductive biology of Carassius carassius in Melka-Wakena Reservoir, *were studied .Samples of Carassius carassius, were collected monthly during August (2009) through to July (2010) using different centimeter mesh sizes of gillnets. Frequency of ripe gonads suggested that Carassius carassius in the reservoir breeds throughout the year with intensive breeding activity during May to August and less intensively in September and October. Intensive breeding was coincident with the rainy seasons. Estimated fecundity, which was linearly related with fish and gonad size.*
Key Words: *Breeding season, Carassius carassius, Fecundity, Melka-wakena Reservoir*

INTRODUCTION

The inland water body of the county is estimated at about 7,400 km^2 of lake area and about 7000 km total length of rivers [9]. From the inland water bodies, crater lakes are well represented in Africa, including Ethiopia [2]. The reservoir in the country may provide admirable opportunities for comparative biological studies owing to the considerable variations in their morphometric, physical and chemical features. Among this Melka-wakena reservoir is the case in point.

Cheap source of protein is urgently required to support an ever increasing human population. Fishery resources definitely can offer one of the solutions to the problem of food shortage in a country like Ethiopia. Moreover, *Carassius carassius* is the most preferred fish species next to *Oreochromis niloticus* and *Clarias garipines* in Ethiopia for human consumption and the demand has increased rapidly over the last some year back.

Therefore, knowing the information on the breeding and fecundity of *C.carassius* can provide basic knowledge for the proper management of the resource. However, such knowledge is not available for the species in the reservoir and this has hindered proper management of the fishery. Therefore, the major objective of the present study was to generate basic biological information that could help to make proper exploitation and management strategies on the Ethiopian fishery in general and *C.carassius* in the reservoir in particular. The specific objectives were to assess breeding season and fecundity of *C. carassius* in Meleka-wakena reservoir.

METDOLOGIES

Field Sampling and measurement

Samples of *Carassius carassius* were collected monthly between August 2009 and July 2010 using gill nets from different sites. The gear were set parallel to the shoreline in the afternoon (05:00 pm) and lifted in the following morning (7.00 am). Then, immediately after capture, total length (TL) and total weight (TW) of each specimen were measured to the nearest 0.1 cm and 0.1g, respectively. The ovaries were split longitudinally and turned inside out, to ensure the penetration of the preservative before they were stored in labeled jars. Finally, ripe ovaries were preserved in Gilson's fluid to estimate fecundity [1]. Preserved samples were then transported for further laboratory analysis.

Determination of breeding season and fecundity estimation

The breeding season of *C. carassius* was determined from monthly frequency of fish with ripe gonads. The fecundity of ripe gonads preserved in Gilson's fluid was estimated gravimetrically. To estimate

fecundity the preservative was replaced with water, and the eggs were washed repeatedly, decanting the supernatant.

The fecundity estimate was then obtained by weighing the entire eggs, and two sub-samples of 1000 eggs, each of which were all similarly, dried. The eggs were counted and weighed using a sensitive balance. The total number was computed using the following ratio:

$$N/n = W/w$$

Where, N = Unknown total number of eggs
n = Number counted in sub sample (1000)
W = Weight of all eggs (g)
w = Weight of the sub sample (g)

Least squares regression was then used to find the relationship between fecundity and total length, total weight and gonad weight [3].

RESULT AND DISCUTION

Breeding season

The frequency of ripe females and males *C.carassius* ranged from 2 - 18% and 3 - 18%, respectively, with high frequency occurring in August and September, and also between May and July (Fig. 1). The result suggests that, while some fish in breeding condition may be present throughout the year, intensive breeding takes place during March to July and in between August and October.

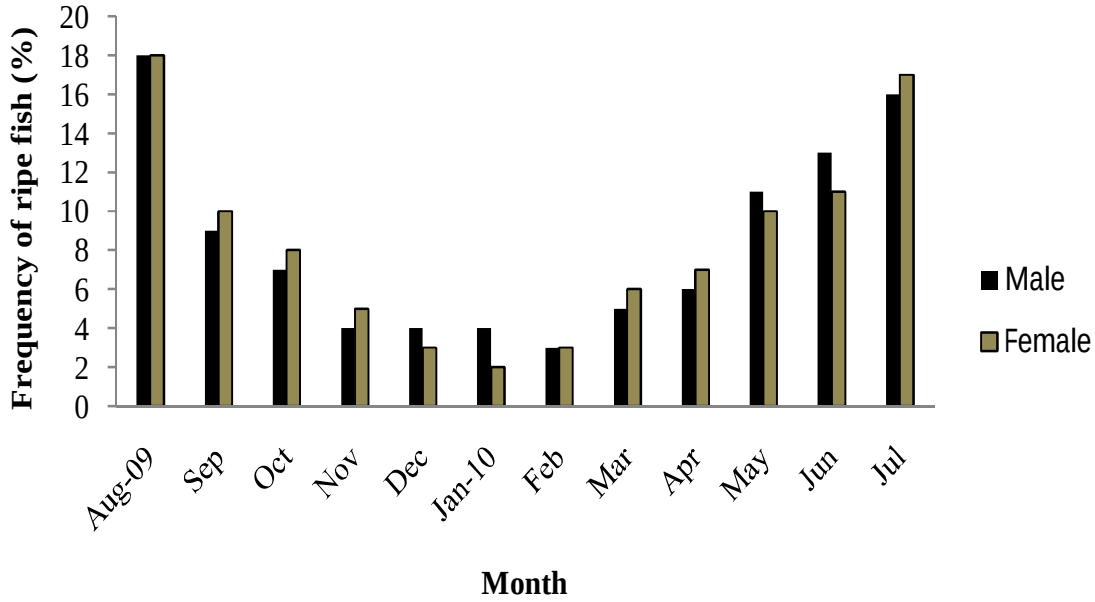

Figure 1. Temporal variation in frequency (%) of ripe female and male *C. carassius* in the reservoir

Intensive breeding activity of *C.carassius* in the reservoir was coincident with the rainy season. Thus, rainfall and associated factors may act as cues for spawning by the fish so that offspring are produced at a time of better growth and survival. The role of rainfall in fish spawning is well documented [7]. Runoff, for instance, results in increased nutrient concentrations which in turn result in improved food quantity and quality [12 and 4]. Correlation between rainfall and peak breeding activity has also been reported for the same species [5] and other species [12; 13; 3; 4 and 11] in Ethiopia, and elsewhere [6; 7; 8 and 10].

Fecundity estimation

Fecundity was estimated for 98 ripe females whose total length and total weight ranged from 27 cm to 37 cm and 400 g to 1200 g, respectively. Absolute fecundity was estimated to range from 30759 to

175141 eggs with a mean of 126857. Fish in poor body condition are reported to have less fecundity than those in better condition.

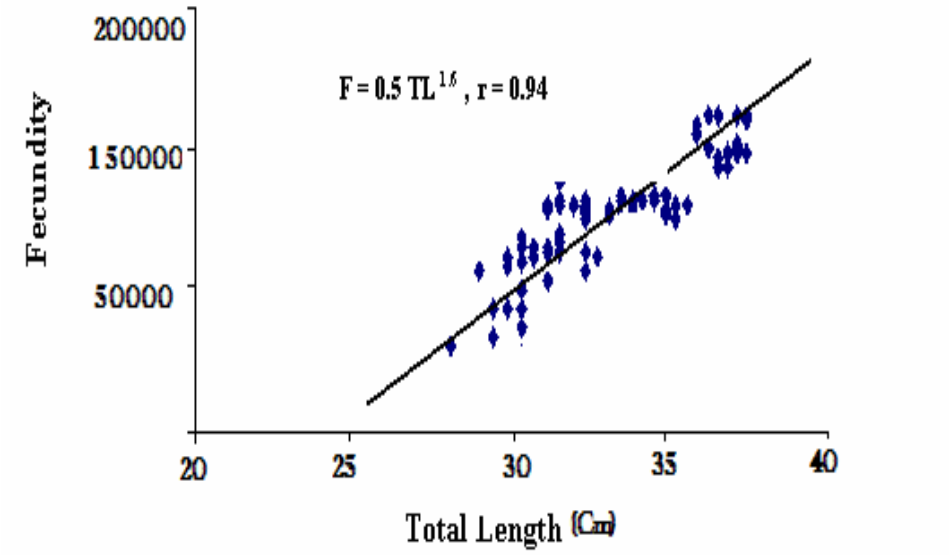

Figure 2. Relationship between fecundity (F) and total length (TL) of *C. carassius* in the reservoir

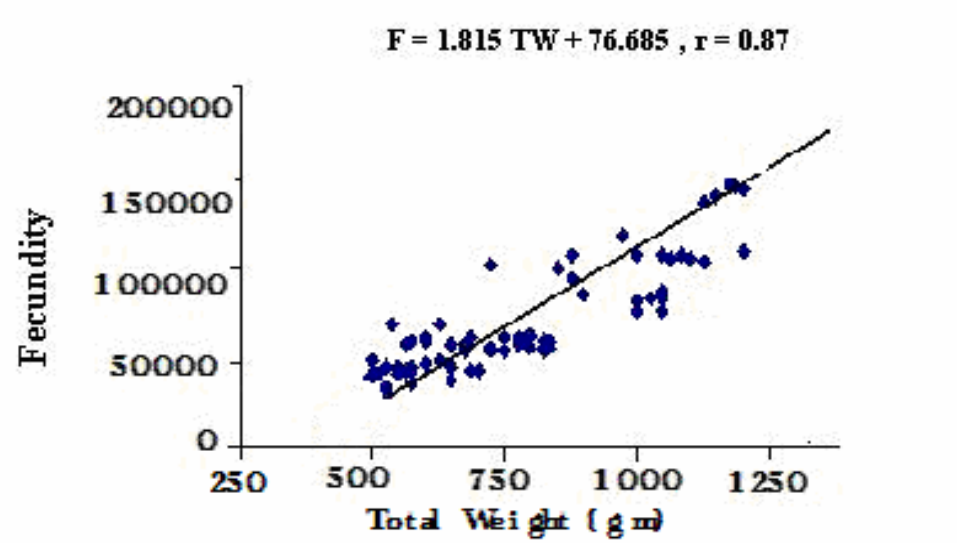

Figure 3. Relationship between fecundity (F) and total weight (TW) of *C. carassius* in the reservoir

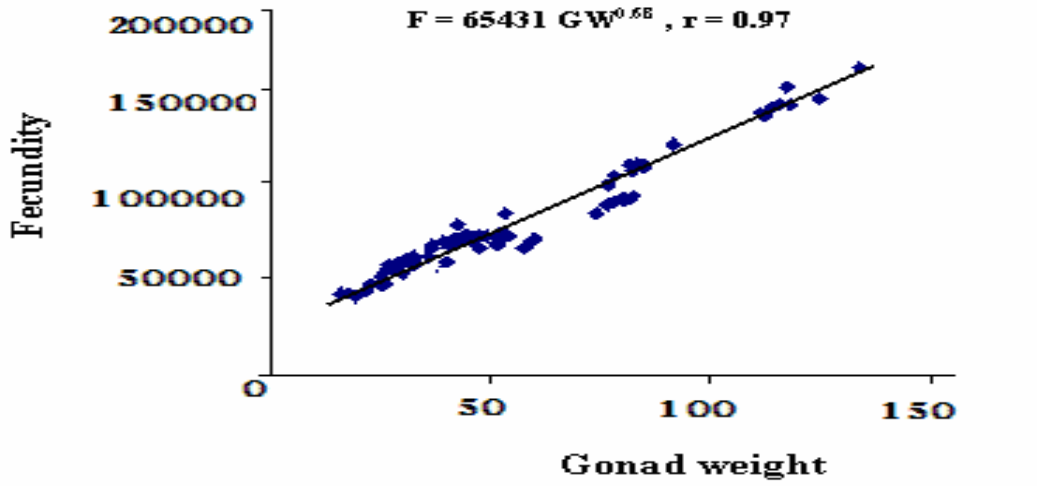

Figure 4. Relationship between fecundity (F) and gonad weight (GW) of *C. carassius* in the reservoir

CONCLUSION AND RECOMENDATIONS

The issue of appropriate management is an urgent need to address if the contribution of the fishery as a source of food, income and employment for the majority of the population around the lakes in particular and in the country in general and; we need to follow the following recommendations:

- Closed season or area is the most common regulatory measurement to conserve the resources.
- The impression that fishery management is needed only when a fishery resource becomes over exploited might result in over fishing. Thus attempts should be made to curb over fishing by taking proper management measures along with development efforts around the reservoir.
- Training should be given for the community around the water bodies
- Traditional approaches are a noted problem for sustainable fisheries management. Therefore, scientific approach will be contributed to the fisheries management in the reservior.
- Due attention should be given by bureaus of ministry of agriculture and development and non-governmental organizations operating in the area to develop the infrastructure of the areas and to give training and extension service to develop the fishery

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