Identification, distribution, abundance and species composition of fish in the Chitgar Lake (Tehran Province of Iran)

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Introduction

This study was conducted in the Chitgar Lake in 2014.Chitgar Lake, 130 hectares in area is an artificial lake located in the north-west of Tehran City, Iran. For the first time the seasonal sampling of fish was done by three fishing methods gill net, cast net and beach seine, and a random sample of 3160 fish was collected. Some morphometric and meristic factors of samples were studied in the laboratory, and the distribution, abundance and species composition were determined.

According to the results obtained, 95% of fish population was comprised of aggressive species such as; *Hemiculter leucisculus*, *Pseudoras boraparva* and *Alburnus hohenackeri*. There are 14 fish species in the lake, 9 species of which belong to the Cyprinidae family, 2 species including *Capoeta buhsei* and *Capoeta capoeta* are the only native species.

Chitgar Lake, also known as the Lake of Martyrs of the Persian Gulf, the largest artificial lake in the middle-east was constructed in 2012 in the north-west of Tehran.

The Lake with an area of 130 hectares is situated at 1260 meters above the sea level and is located at the latitude and longitude coordinates of $35^°$, $43^′$, $44^″$-35°, $45^′,50^″$N and $51^°,12^′,5^″$-$51^°,14^′,8^″$ E. The depth of the Lake is 5-8 meters and the Kan River in the west of Tehran is the main source of water, the remaining coming from sub- surface waters.

Fresh water fishes spend all their life time in fresh water resources including rivers and lakes. 42% of species live in the freshwaters. In 2010 the total world fish catch was 149 million tons (FAO, 2012). 94% of the freshwater fish catch occurred in developing countries (FAO,

2007). Studies showed that nutrition of 55 million people in Mekong River basin in south-east Asia depend on freshwater fishes (Baran *et al.*, 2007). Freshwater fishes produce more than 6 percent of animal protein for human population of the world. Bangladesh, Indonesia, the Philippines, Thailand and Vietnam are the countries which obtain 40-50% of animal protein from freshwater fishes (Briones *et al.*, 2004). In recent years some risks including overfishing, climate change, dryness and exotic species threat freshwater resources (Delgado *et al*., 2003). Unfortunately in the past decades,

exotic species were intentionally or unintentionally introduced into the freshwater resources of Iran and occupied the ecological niche of native species. *H. leucisculus, P. parva* and *Carassius auratus* are aggressive species. Exotic species also entered into the Chitgar Lake their identification, distribution and abundance is important for the sustainable development and management of the Lake in the future.

Materials and methods

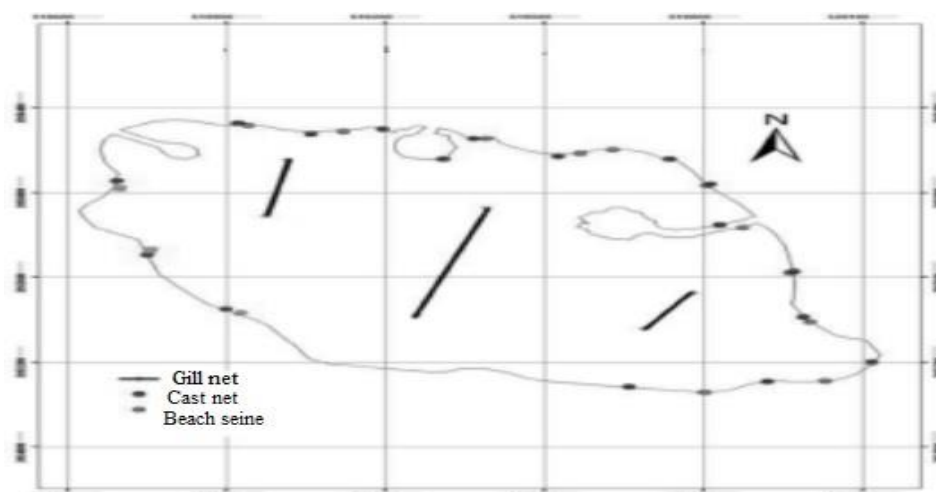Between February and October 2014 seasonal sampling was done using a boat.

Figure 1: Map of fishing areas by using different methods of fishing.

Three different methods were used for sampling:

1-Three string lines of gillnet were used for three days in 3 stations with a length of 300 m in each line of net .The nets were checked two times a day. The mesh size of nets were 15, 20, 30, 40, 50 and 60 mm .

2-Cast nets with 4 mm of mesh size and height of 3m were used in 17 stations of

the lake only in the last seasonal sampling.

3-Beach seine with 4-6 mm of mesh size, 30m long and 2.5m high was used in 14 stations along the shore of the lake only in the last seasonal sampling.

Some of specimens were observed in the laboratory beside the Lake and the remaining were preserved in 10 % of formalin and transferred to the main laboratory. In the laboratory fishes were

observed and identified based on morphologic and meristic characters by using references including Berg (1949), Saadati (1997), Armantrout (1980), and Coad (2015).

Statistical analysis was performed using Excel and the SPSS softwares.

Totally 3160 specimens were obtained in this study.

Result and Discussion

The results showed that 14 fish species belonging to 6 families were recorded in the lake (Table1) Nine of these species belonging to the family Cyprinidae were abundant in the Lake.

Table 1: List of identified fishes in the Chitgar Lake.

No	Family	Fish species	Fishing net		
			Gill net	Seine	Cast net
1	Cyprinidae	*Alburnus hohenackeri*	+	+	+
2	Cyprinidae	*Capoeta buhsei*	+	_	_
3	Cyprinidae	*Capoeta capoeta*	+	_	_
4	Cyprinidae	*Carrassius carrassius*	+	_	+
5	Cyprinidae	*Cyprinus carpio*	+	_	+
6	Cyprinidae	*Carrassius auratus*	+	+	+
7	Cyprinidae	*Hemiculter leucisculus*	+	+	+
8	Cyprinidae	*Hypophthalmichthys molitrix*	+	_	_
9	Cyprinidae	*Pseudorasbora parva*	_	+	+
10	Cichlidae	*Astronotusocellatus*	+	_	_
11	Loricariidae	*Glyptoperichthysgibbiceps*	+	_	_
12	Pangasiidae	*Pangasiushypophthalmus*	+	_	_
13	Poeciliidae	*Gambusiaholbrooki*	_	+	_
14	Serrasalmidae	*Piaractusbrachypomus*	+	_	_
	Total		12	5	6

Two species, *Capoetabohsei* and *Capoeta capoeta* are native in that *Capoeta bohsei* entered the lake from the Kan River. According to the results of this study *Hemiculture leucisculus* which comprised 62 % of the catch and included 1169 individuals was abundant using the beach seine method. *A. hohenackeri* and *P. parva* with 35% abundance and 651 individuals, and 3% abundance and 4 individuals, respectively came next. Total number of specimens in beach seine method was 1876 .

Data for *A. hohenackeri, P. parva* and *H. leucisculus* using the cast net method were 38% abundance and 107

individuals, 21 abundance and 59 individuals and 17% abundance and 50 individuals, respectively. The total number of specimens was 284 in the cast net method.

H. leucisculus, A. hohennackeri and *C.carpio* with 69% abundance and 690 individuals, 12% abundance and 125 individuals,8% abundance and 75 individuals, respectively were the observed data for these species using of the gillnet method. Total number of specimens was 1000 in the gillnet method. species composition for the rest of the species in this method was 4% (Table2).

Table 2: The combination of fish species using the Gillnet Method in the Chitgar Lake.

Other	Fish catch	Ind/ha	Lake
Hypophthalmichthys molitrix	11	25	3243
Capoeta buhsei	8	18	2358
Piaractus brachypomus	4	9	1179
Astronotuso cellatus	3	7	884
Pangasius hypophthalmus	3	7	884
Carrassius gibelio	2	5	590
Capoeta capoeta	2	5	590
Glyptoperichthys gibbiceps	2	5	590
Hypophthalmichthys molitrix	35	79	10318
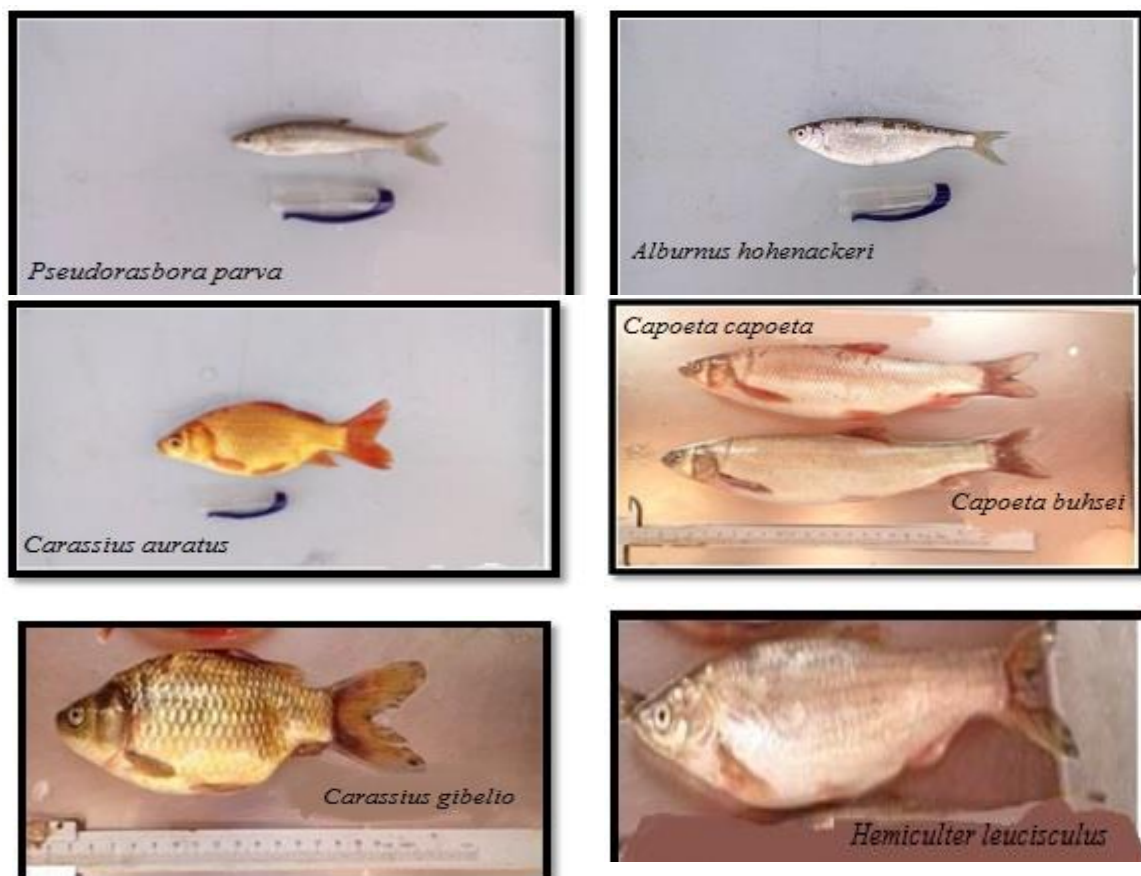
Figure 2: Pictures of important fish species in the Chitgar Lake.

During this study 14 fish species were identified, 9 species of which belong to the family Cyprinidae. Two native species of the genus Capoeta were recognized of which *C.bohsei* entered the lake from Kan River. Cyprinidaehave the most abundance in freshwater resources and make up the dominant population of freshwater fishes in Iran (Abdoli, 2000; Coad, 2015). The results of the present study showed that the main species of the lake belonging to the Cyprinidae family entered by introducing Cyprinids to the Lake in 2013. Five aggressive species including *H. leucisculus, A. hohenackeri*, *P. parva*, *C. auratus* and *C.gibelio* entered along with the introduced species. *C. auratus* was also released by people. Five ornamental fish species were released into the lake by tourists. The fish species of the lake are divided into 4 groups including native, economical, ornamental and

aggressive species. The results of the present study showed that 95% of the fish population of the Lake are aggressive such as *Hemiculter leucisculus*, *P. parva* and *A. hohenackeri*. All of the aggressive species feed on phytoplankton and could cause disorder of the lake ecosystem, outbreak of disease and death of other fish species in the lake. The lack of predator species and high fecundity of aggressive species, make them the dominant species during the past two years in the lake. To maintain the ecological balance it is necessary to control them and the suitable way is biological control using carnivorous fish species.

Acknowledgments

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