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Feeding behavior of brown trout, *Salmo trutta fario*, during spawning season in four rivers of Lar National Park, Iran

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ABSTRACT
Brown trout, *Salmo trutta fario*, has a wide range of distribution in the north of Iran and in Karaj, Lighvanchai and Karun Rivers, but there is no report about its feeding behavior in some water resources including the Lar Natural Park. In order to study feeding behavior of this fish during spawning season, a survey was carried out in the rivers of Elarm, Aab-Sefid, Kamardasht and Delichayi in fall 2008. A total of 140 individuals of brown trout were caught by cast net and electro fishing. Mean weight and length of the samples were 130±79.5 g and 216.9±39 mm, respectively. The age of fish was 2 to 6 years and mean age was 3.02±1.3. The mean relative gut length (RLG) of samples was 0.86±1. It was found that brown trout fed on various preys (32 animal groups), that Chironomidae (88.6%), Simulidae (60%), Baetidae (51.4%) and Tipulidae (50%) have had the most frequency in the gut of brown trout. The proportion of food consumed by trout was Diptera 91.5% (Chironomidae pupa and larvae 85.8%), Coleoptera 6.4% and others 2.1%. Cannibalism was seen scarcely. In conclusion, brown trout consumes a wide range of food items in its spawning season. Therefore, it can be classified as euryphagous and carnivaorous.

Keywords: *Salmo trutta fario, Diet, Lar National Park, Iran.*

INTRODUCTION
Brown trout has a wide range of distribution in the north of Iran and in Karaj, Lighvanchai and Karun Rivers (Coad, 2011). It lives in the upstream region of rivers and elevated lakes containing high ratios of dissolved oxygen. It is a native fish of rivers which flow from the Alborz Mountains in Northern Iran and probably was introduced to other Iranian water bodies. Its existence in some rivers of Tehran was reported firstly by Derzhavin (1934). In addition, brown trout lives in most of the rivers flowing into the Caspian Sea (Armantrout, 1980; Saadati, 1977; Coad, 1979; Araghi, 1996; Abdoli, 1999; Kiabi et al., 1999: Afrayi *et al*., 2000; Abbasi *et al*., 2004; Vatandoost *et al*., 2008; Ghane, 2008; Kheyrandish, 2010). Kazancheev (1981) stated that brown trout also inhabits in the Volga River, Caucasian rivers and the rivers of the southern coast of the Caspian Sea.
However, the stocks of brown trout in Iranian rivers have extremely been damaged and its catch has been limited to sport fishing (Emadi, 1988; Kiabi et al., 1999). Its maximum total length is 100 cm and its weight up to 20 kg (Froese and Pauly, 2011).
Sport fishing is regulated by the Environmental Protection Organization of Iran. For example, the proportion of catch for each fisherman per day is limited to 3 fish specimens and authorized time of sport catch is from 11 July until 10 September for two days in a week.
Nikolski (1954) stated that brown trout has slower growth and less fecundity compared to other Salmonids. The maturity age of male is 2 and of female is 3 years (Vosooghi and Mostajir, 2005; Kazancheev, 1981), but Berg (1948) stated that the maturity age of brown trout is 3-4 years. Abdoli (1999) and Afrayi et al. (2000) reported that the spawning season of this species in Iranian rivers is between October and December.
Feeding behavior of brown trout in Iran was investigated by Araghi (1996) in the Noor River, by Moslemi (1997) and Afrayi et al., 2000 in the Tonekabon River, by

Abbasi et al., 2004 in Guilan Rivers, Fakharzadeh et al. (2008) in the Karaj River and by Vatandoost et al. (2008) in the Ashkrood River, by Abdollahpoor et al. (2011 a,b) in Hevigh and Shafarud Rivers, all in the Caspian Sea basin. Although Elarm, Aab-sefid, Kamardasht and Delichayi Rivers of the Lar National Park are the main habitats of brown trout in Iran, no studies have been carried out on the feeding behavior of brown trout inhabiting in these rivers up to now. This fish is a vulnerable species (Kiabi et al., 1999), and valuable for sport fishing, too, thus the study has been done for obtaining food diversity, frequency and abundance of prey in its gut and to determine food indices for sustainable fisheries.

MATERIAL AND METHODS

The Lar National Park is located 55 km at east of Tehran. Its elevation from open seas is 2531 m and its area is 276 km^2 (Elmi, 2003). The main rivers of the park are: Elarm, Aab-sefid, Kamardasht and Delichayi rivers. After constructing Lar dam in this area, water flow of these rivers form reservoir lake of the dam (Figure 1). Outlet of the dam is Lar River which after joining to Haraz River, flows into Caspian Sea near Babol city (Jafari, 1995; Elmi, 2003).

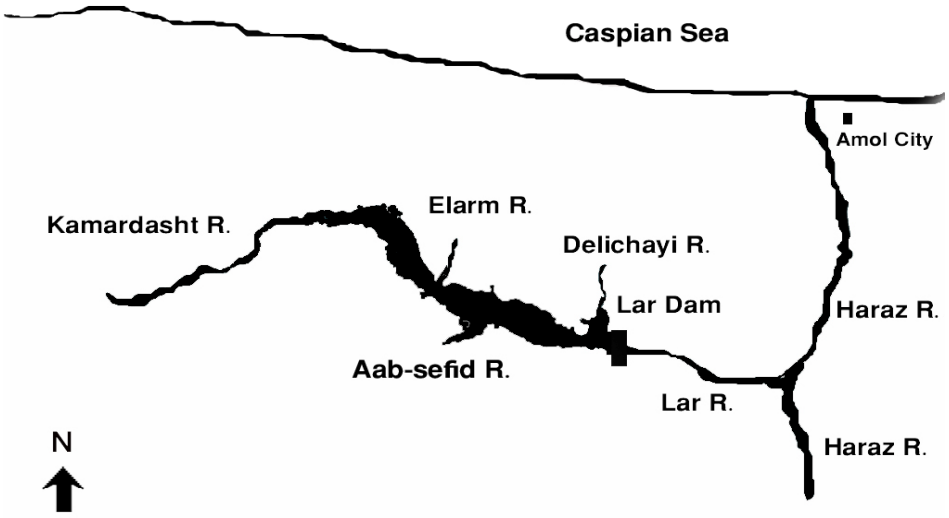

Fig 1. A view of the studied rivers in the Lar National Park (North Iran)

Samples of brown trout were caught using cast nets and electro fishing in downstream areas of these rivers between October and December 2008 (spawning season). Mesh size of cast net was (a=10 mm) and the voltage of Electro shocker (trade mark: Karl Von Keitz) was 200-300 volts with flow strength of 5 amperes. Total length of fish was measured to the nearest 1 mm and weight of fish was taken to the nearest 1 g. Age of fish samples was determined by observing growth rings on otolith using stereoscopic microscope. Gut content of each fish was evacuated and fixed in 4% formalin solution, and then identified in the laboratory following Merritt et al. (2008) and Kasimov (2000). In addition, gut length of samples was measured and its ratio to fish total length was determined. Food preference, food relative importance, basic and incidental foods were also determined following Biswas (1993). Sampling from benthic organisms was done on a monthly basis using Surber sampler with a sectional area of 1600 cm^2. Kruskal-Wallis non-parametric analysis was used to determine differences in population after normality test and Mann-Whitney Test was used to separate groups (age, sex, month and river) (Zar,1984).

Results

Studying on the sexual organs of 140 captured fish from four rivers (Elarm, Aab-sefid, Kamardasht and Delichay) of the Lar National Park showed that all fish were at stage 4 or 5 of sexual maturity. The range and average weight of fish were 29-451 and 130.7±79.5 g respectively and its total length was 142-328 (216.9±39) mm. Mean

weight and total length of males was 148.8±89.1 g and 220.4±4 mm respectively, while that of females was 112.7±64.9 g and 200.9±3.6 mm. Captured fish were between 2-6 years old with a mean age of 3.02±1.3 years.. The range of relative gut length (RLG) was 0.55-1.08 and its average was 0.86±0.1. Average RLG for 2 and 3 years old specimens was 0.84±0.1, and 0.9±0.06 for 4 - 6 years old specimens.

Study of gut contents of captured samples showed that all of them were fed (Coefficient of Vacuity=0). Index of gut fullness varied between 43.3 and 1336 with an average of 186.3±162.2. The average of this index for 2 years old fish was 213.9±196.1 (n=86) and 142.4±71.4 (n=54) for 4-6 years old fish. ANOVA test shows that there is no significant difference ($P \geq 0.05$) in gut fullness recorded in October and December.

The results revealed that brown trout inhabiting in Elarm, Aab-sefid, Kamardasht and Delichay Rivers feed mainly on 34 different food items consisting of Oligochaeta (Hirudinea order and Lumbricidae family), Gastropoda (Physidae family), Diptera (Chironomidae, Tipulidae, Simulidae, Muscidae, Formidae, Ichneumonidae, Colicoidae and Tabanidae families), Coelifera sub-order, Ephemeropetra (Baetidae and Heptagenidae families), Trichoptera order (Sericostomidae, Hydropsichidae, Limnephilidae, Psychomyiidae and Philopotamidae families), Lepidopetra order, Hemiptera order (Corixidae family), Coleoptera order (Hydrophilidae, Dytiscidae, Elmidae and Elateridae families), Odonata Order (Agronidae family), Homoptera order (Fulgoridae and Aphilidae families), Amphipoda order (Gammaridae family), Archnida order (Hygrobatidae family) and brown trout.

Food preference:

In Aab-Sefid River; Diptera and Coleopetra were the basic food, Ephemeropetra, Lepidoptera, Hemiptera and Homoptera were secondary food and all other orders were considered as incidental food. In Delichayi River; Diptera, Ephemeroptera, Trichoptera and Oligochaeta were basic food items and Coleoptera was secondary food. In Elarm River; Diptera, Ephemeroptera, Trichoptera and Amphipoda were primary food items and Hemiptera and Coleoptera were the secondary ones. In Kamardasht River, Dipetra, Hemiptera, Coleoptera and Gostropoda were primary food items and Oligochaeta, Ephemeroptera, Trichoptera, Homoptera and Prostigmata were known as secondary ones. In all the studied rivers, primary food items were Diptera (98.6%), Ephemeroptera (54.3%) and Coleoptera (51.4%) and secondary ones were Hemiptera (38.6%) Trichoptera (31.4%), Amphipoda (27.1%), Lepidopetra (17.1%), Prostigmata (15.7%), Homoptera (12.9%), Oligochaeta and Gastropoda (Figure 2).

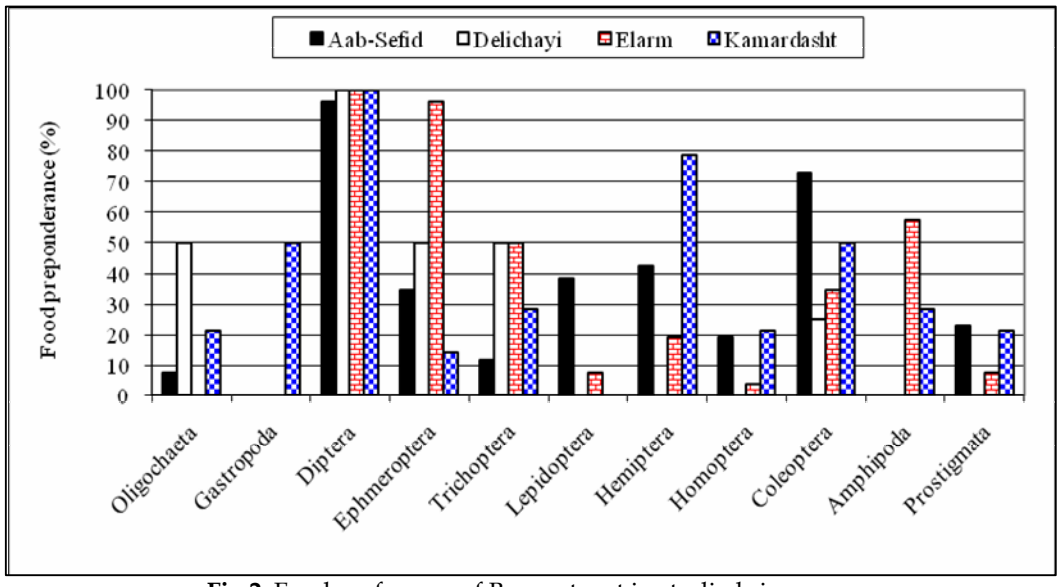

Fig 2. Food preference of Brown trout in studied rivers

In males Dipetra and Ephemeroptera were primary items and Gastropoda, Trichoptera, Lepidoptera, Hemiptera, Homoptera, Coleoptera, Amphipoda and Prostigmata were secondary ones. In females Dipetra and Coleoptera were primary and all the food items mentioned for males except Gastropoda were secondary ones (Figure 3).

In 2 and 3 years old fish, Diptera and Coleoptera were primary food and the secondary ones consisted of other food items except Gastropeda, Odanata and fishes. Also in 4-6 years old fish, Diptera and Ephemeroptera were primary food and other food items were identified as secondary ones.

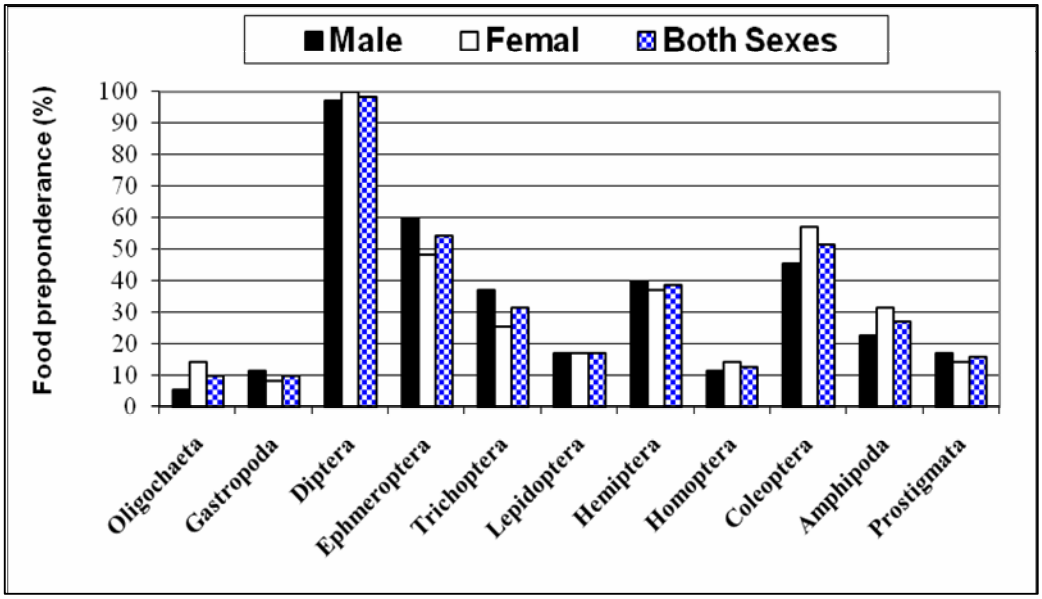

Fig 3. Food preference of brown trout for male, female and both sexes

Food Relative Importance:

Food relative importance in the gut of brown trout in Lar National Park Rivers showed that in Aab-sefid River Dipetra formed 76.3% amount of prey followed by Coleoptera (12.07%), Hemiptera (7.48%), and Ephemeroptera (2.04%) and other food items consisted of 2.04% of the diet. In Delichayi River Diptera (96.3%), Trichoptera (1.76%), Ephemeroptera (1.06%), Oligochatea (1.01%) and other preys (0.18%) formed the diet. In the Elram River, just like in the Delichayi River, Dipetra was the most abundant prey (96.84%) followed by Amphipoda (1.21%) and Ephemeroptera (1.11%). In the Kamardasht River, proportion of Diptera was less than that in other rivers (67.96%). The proportion of Oligochatea and Gastropeda were 6.49% and 5.99%, respectively. Other preys formed 5.06% of the diet of brown trout (Figure 4).

Sampling benthic organisms in the rivers under study (Table 1) showed that the order Diptera (mainly Chironomidae) and Oligochaeta Class have high abundance in all rivers and other benthos have low abundance. Diptera (47.76%), Oligochaeta (28.36%) and Ephemeroptera (16.42%) were abundant in Aab-Sefid River bed, Diptera (49.26%) and Oligochaeta (41.38%) were abundant in Delchayi River, Diptera (37.12%), Oligochaeta (39.26%) and Ephemeroptera (6.75%) were recorded in the Elarm River and Diptera (37.76%) and Oligochaeta (53.80%) were recorded in Kamardasht River bed. Comparison of abundance of food items in the environment (river bed) and gut of brown trout showed that the fish consume low amounts of Oligochaeta but feed mainly on Diptera order which is dominant in the environment and the gut, while other food items were consumed less, showing a good relation in abundance of benthic animals between the environment and trout gut contents.

Table 1. Abundance of benthic organisms in four studied Rivers (Number/m²)

Benthic Order	Family	Aab-sefid	Delichayi	Elarm	Kamardasht
Oligochaeta	Lumbricidae	2	1	6	1
"	Unknown	17	83	122	210
Hirudinea	Unknown	0	1	10	0
Gastropoda	Unknown	0	3	11	3
Diptera	Chironomidae	31	95	107	127
"	Simulidae	1	2	11	5
"	Tipulidae	0	2	2	11
"	Tabanidae	0	1	1	5
Ephemeroptera	Baetidae	7	6	10	10
"	Heptagenidae	2	0	2	0
"	Ephemeridae	2	1	10	3
Coleoptera	Elmidae	1	0	4	5
"	Hydropsychidae	0	0	11	4
"	Dyticidae	1	2	0	2
Trichoptera	Psychodidae	1	1	4	3
"	Limnephilidae	2	3	12	2
Amphipoda	Gammaridae	0	2	3	1

The present study showed that in all the investigated rivers, the diet of males consisted of Diptera (94.04%), Coleoptera (1.34%), Ephemeroptera (1.03%) and other food items (2.57%), while in that of females, Diptera (87.77%), Hemiptera (4.22%), Coleoptera (3.56%) and Amphipoda (1.71%) formed the prey items. In 2 and 3 year old fish, Diptera formed 90.47% of total amount of food in the gut of brown trout followed by Coleoptera (3.07%) and Hemiptera (2.59%). In older fish (4-6 year olds), Diptera (93.26%), Hemiptera (1.82%) and Amphipoda (1.44%) comprised the food in the gut of brown trout (Figure 5). In these rivers, Diptera was the most abundant prey in the gut of brown trout (94.25%) after which Hemiptera (1.28%) and Ephemeroptera (1.1%) were the most abundant.

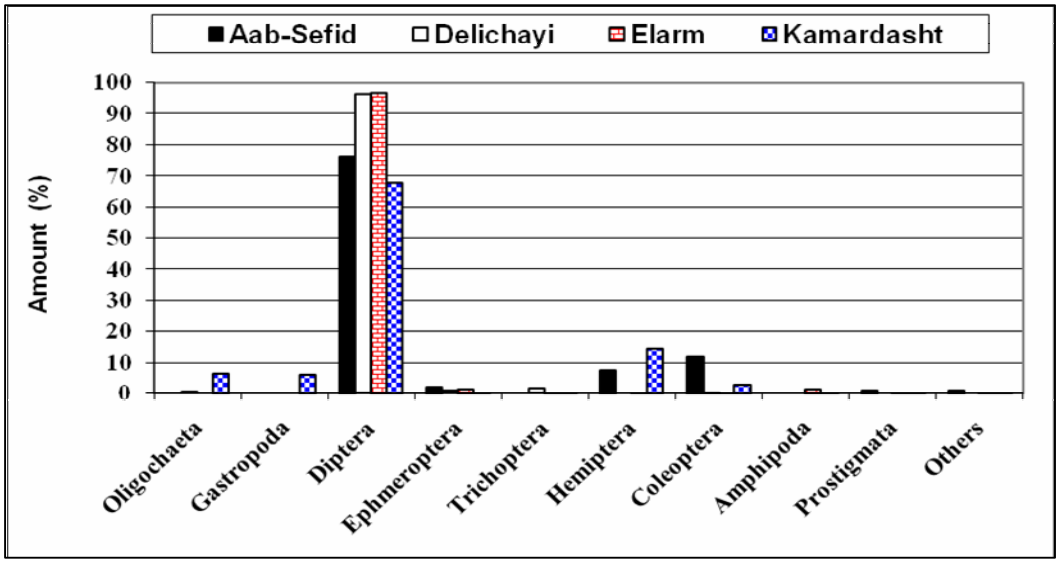

Fig 4. Food relative importance of brown trout's gut in studied rivers

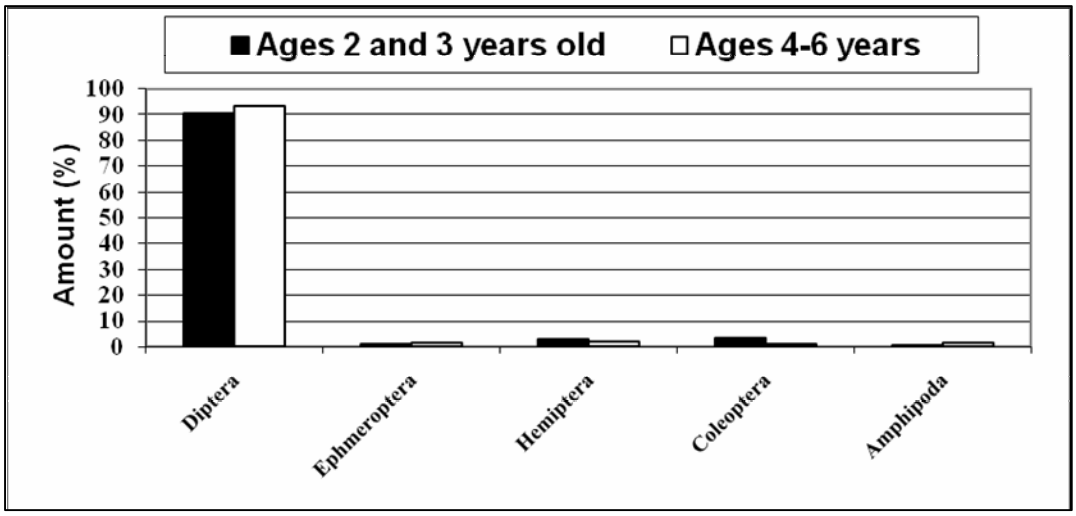

Fig 5. Relative importance of food items in the gut of brown trout in different ages

DISCUSSION

Brown trout exhibits a large variation in feeding ecology and has a capability to include a wide range of prey in their diet ranging from small zooplankton to relatively large fish. They feed mainly on various small organisms. Large ones become predator, feeding on small fish, and they readily eat insects falling into water (Berg, 1948; Johnsen, 1978 and Johnson, 1989). In addition, according to Kazancheev (1981) trout feeds mainly on insect larvae, other fishes and even their eggs. The analysis of gut contents is a suitable way to study feeding behavior in fishes in their natural environment (Houlihan, 2002).

The wide spectrum of food items in the diet of brown trout diet in the Lar National Park Rivers, including 34 food organisms, proves that this fish is a euryphagous species. Froese and Pauly (2011) state that brown trout (*S. trutta fario* and *S. trutta trutta*) feed on benthic invertebrate, insect larvae, aerial and terrestrial insects, mollusks, crustacea and in addition, adults consume fish and frogs. The diet of fish may change continuously with body size (Werner and Glliam, 1984). Heggenes et al (1993) noted that the diet and feeding behavior changes by season, habitat and fish size while it does not differ by sex. Abdollahpoor et al. (2011a and b) reported 31 families belonging to 14 orders in the food spectrum of trout in the Shafarud River and 31 families belonging to 13 orders in that of trout specimens from the Hevigh River in the Southern Caspian Sea). Heggenes et al. (1993) state that stream dwelling resident brown trout, *Salmo trutta*, feed on a variety of prey items. Alp and Buyukcapar (2005) state brown trout (*S. trutta macrostigma*) mainly feed on benthic animals, in firniz stream of the River Ceyhan, which verifies the results of the present study. Amphipods, aquatic insects, zooplankton, mollusks, aerial insect larvae have had the most preference by trout in Azerbaijan republic, and large specimens mainly feed on their fry and fingerlings (Gholief, 2005).

Comparison of relative gut length (0.86±0.1) shows that the fish is a carnivorous species, with a prey diversity of 34 organisms. Abdollahpoor et al. (2011a and b) reported that the fish feed on more than 35 animal families in the two rivers in the southern Caspian Sea. The RLG determined was 0.85±0.10 and 0.87±0.07 in Shafarud and Hevigh Rivers, respectively (Abdollahpoor et al., 2011a and b) that supports the results of the present study. In the present study, all of fish samples had fed (C.V=0), which is similar to the results of study by Abdollahpoor et al. (2011a and b). This situation is expected considering the prey diversity in these rivers continuously available for the greedy fish.

Gut fullness determined in the present study was 186.3±162.2 which is very close to the reported values (195.5±157.4 and 296.5±333.7) for this index in Shafarud and Hevigh Rivers, respectively (Abdollahpoor

et al., 2011a and b). According to Frost and Brown (1967), Bridcut and Giller (1993) and Alanara and Baranas (1997), under natural conditions, fullness indices were the lowest in autumn, then increased from winter to summer. Thus it can be said that decrease amount fullness intensity of trout in spawning season (fall).

Maitland (1965), Debijak (1986), Ferriz (1988) and Afrayi et al. (2000) reported that brown trout had maximum feeding intensity in spring. Similarly, Johnsen (1978), Vosooghi and Mostajir (2005) and Abdoli (1999) confirmed intense feeding of brown trout in spring. Araghi (1996) found a good relation in frequency and abundance of benthic animals between river bed and the gut of studied fish in Noor River (North Iran).

There is a difference in food preference of salmon in different ages (Elliot, 1967). For example, salmon at low ages mostly feed on benthic organisms, because in these ages, if they feed on the surface, there will be an increase in predation. Maitland (1965) reported that brown trout in ages more than six months feed mostly on Ephemeroptera. In the Ashkrood River, a tributary of Tejan River, in the Iranian coast of the Caspian Sea, one year old fish mainly feed on Diptera, two year olds on Ephemeroptera and elders feed on all food organisms, especially on Diptera (Vatandoost et al., 2008). In Ashkrood River, Diptera was a positive selection but other orders (Ephemeroptera, Plecoptera, Trichoptera, worms) were negative selection by trout. Heggenes et al (1993) reported similar feeding habits in fish in January, February and December which is similar to the results of the present study.

Alp and Buyukcapar (2005) reported that most prey eaten by *Salmo trutta marostigma* in the Firniz River in Turkey, were benthic organisms. Bottom food items were dominant in diet of smaller ones; plankton is also important especially for smaller brown trout in fall and winter (Johnsen, 1978). Brown trout diet concluded that the species is mainly a bottom feeding fish (Hunt and Jones, 1972). The present study also showed that the feeding behavior of brown trout in Lar National Park Rivers was comprised of more than 95% of benthic organisms. Diptera, Trichoptera and Ephemeroptera had the maximum frequency in Noor River (Araghi, 1996), while Plecoptera, Ephemeroptera and Simulidae,showed highest frequency in Tonekabon River (Afrayi et al. (2000). In Shafarud River, Diptera (97.9%), Ephemeroptera (83.3%), Plecoptera (52.1%) and Trichoptera (52.1%) were considered primary food and in Hevigh River Diptera (93.8%), Ephemeroptera (86.4%), Trichoptera (39.5%), Plecoptera (17.3.1%) and Coleoptera (17.3%) had the highest frequency in the gut of studied fish. In Autumn , Diptera and Ephemeroptera were the primary food items in Shafarud and Hevigh Rivers (Abdollahpoor et al., 2011a and b). But, Fuchetti et al. (2003) reported that trout at Nera River (Italy) displayed a negative selection towards some Ephemeroptera and Diptera prey and a positive selection for Trichoptera prey. Sagar and Glova (1995) and Crespin De Billy et al. (2002) showed that prey selection by trout was driven by prey vulnerability which at times is linked to predator foraging behavior and abiotic characteristics of the stream.

In the studied area, Diptera was the most abundant food item for brown trout of all age groups. Similar results were reported by Araghi (1996) in the Noor River, Afrayi et al. (2000) in the Tonekabon River, and Fakharzadeh et al. (2008) in the Karaj River of Tehran province. In the Tonekabon River (Moslemi, 1997), Diptera (34.0%), Ephemeroptera (24.0%) and Plecoptera (16.0%) had the highest abundance in trout gut. In Karaj River (Fakharzadeh *et al.*, 2008), Trichoptera (58.0 %), Ephemeroptera (8.0%) and Diptera (7.0%) constituted the highest abundance in trout gut. In Ashkrood River (Vatandoost et al., 2008), Trichoptera (47.0 %), Ephemeroptera (20.0%) and Diptera (16.0%) constituted the gut contents of trout According to Gholief (2005), prey composition in Azerbaijan republic was amphipods (21.2%), aquatic insects (21.2%), mollusks (17.3%), aerial insect larvae (9.6%), zooplankton (19.2%) and others (11.5%) of total numbers. In Haraz River the prey composition in spring was Trichoptera (53.9%) and Plecoptera (40.5%), and Ephemeroptera (51.9%) and Trichoptera (44.3%) in summer and finally in fall Ephemeroptera (87.0%) and Trichoptera (11.5%) constituted the main food items in brown trout (Banagar

et al., 2008). Diptera (61.4%), Ephemeroptera (24.7%) and Trichoptera (5.1 %) constituted the highest prey numbers in trout in Hevigh River (Abdollahpoor et al., 2011b).

Oscoz et al. (2002) stated that Diptera and Ephemeroptera are the primary food items of brown trout in rivers of Spain such as Erra River. In the Nera River in Italy, brown trout mostly feed on Diptera, Ephemeroptera, Trichoptera and Plecopter (Fochetti et.al. 2008). In addition, Abdoli (1999) found that in the Iranian Rivers brown trout feed on the same organisms. River resident salmonids can change their food preference in relation to change in prey density (Fausch et al., 1997 and Mclaughlin et al., 1999).

The present study also showed that the abundance of Diptera in the gut of captured fish in the Aab-sefid River was more than that in the other rivers. Sampling benthic organisms also showed their higher abundance in this river than in the other rivers. The gradient of Aab-sefid River is less than other studied rivers and has no fast streams; therefore Diptera dominates in this river. Ghane (2008) found that in rivers with slow stream and in downstream of rivers, Diptera is the dominant benthic organism. Further more, Abbasi *et al*. (2004) found that Diptera was the main food item of brown trout living in the rivers of the Guilan Province in the Iranian coast of the Caspian Sea in the fall.

However, some authors have not detected those differences when trout are two years old or older (Vollesttad and Anderson, 1985). Similarly, our results show that there are no significant differences between gut contents of 2-3 year olds and 4-6 years olds of brown trout (ANOVA test, $P \geq 0.05$). In addition, there were no significant differences in feeding habits between males and females ($P \geq 0.05$).

In this study, it was found that a little amount of Oligochaeta class was consumed by brown trout, that maybe because of tiny size and easy digestion of this item and/or other reasons. According to Grims (1963), Oligochaeta are not usually available for trout because they are hidden in bottom sediments.

In conclusion, brown trout inhabiting in the rivers of Elarm, Aab-sefid, Kamardasht and Delichayi feed on a wide range of food items (usually benthic animals), mainly consisting of Oligocheta, Gastropoda, Diptera, Coelifera, Trichoptera, Lepidopetra, Hemiptera, Coleoptera, Odonata, Homoptera, Archnida and the feeding behavior of brown trout on these organisms has direct relation to their abundance in these rivers. It can also be concluded that they fed continuously in the spawning season, and were ready for reproduction in December.

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بررسی رفتار تغذیه ای ماهی قزل آلای خال قرمز (Salmo trutta fario) در فصل تخمریزی در چهار رودخانه از پارک ملی لار ایران

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چکیده

ماهی قزل آلای خال قرمز (Salmo trutta fario) پراکنش وسیعی در نقاط شمالی ایران و در رودخانه های کرج ، لیقوان چای و کارون دارد ، اما هیچ گزارشی در مورد رفتار تغذیه ای این ماهی در برخی از منابع آبی از جمله پارک ملی لار وجود ندارد. به همین منظور مطالعه رفتار تغذیه ای این ماهی در هنگام تخمریزی در رودخانه های الرم، آب سفید، کمردشت و دلیچایی در پائیز ۱۳۸۷ انجام شده است. در مجموع ۱۴۰ نمونه از ماهیان قزل آلای خال قرمز بوسیله تور پرتابی (ماشک) و دستگاه الکتروشوکر صید گردیدند. میانگین وزن و طول ماهیان نمونه برداری شده بترتیب ۷۹/۵ ±۱۳۰ گرم و ۳۹ ± ۲۱۶/۹ میلی متر بودند. سن ماهیان از ۲ تا ۶ و میانگین سن ۱/۳ ± ۳/۰۲ سال بود. میانگین طول نسبی لوله گوارش (RLG) نمونه ها ۰/۱±۰/۸۶ بود. معلوم گردید که ماهی قزل آلای خال قرمز در تغذیه از طعمه های مختلف (۳۲ گروه جانوری) شامل شیرونومیده (۸۸/۶ درصد) ، سیمولیده (۶۰ درصد) ، بتیده (۵۱/۴ درصد) و تیپولیده (۵۰ درصد) استفاده نموده که این موجودات اغلب فراوانی را در روده ماهی فوق داشتند. نسبت موادغذایی مصرف شده توسط ماهی قزل آلا ، ۹۱/۵ درصد راسته دیپترا (پوپا و لارو شیرونومید ۸۵/۸ درصد) ، قاب بالان (۶/۴ درصد) و سایر اقلام غذایی ۲/۱ درصد بودند. همجنس خواری بندرت دیده می شد. در نتیجه می توان گفت که ماهی قزل آلای خال قرمز در فصل تخمریزی طیف وسیعی از اقلام غذایی را مصرف می نماید. بنابراین می توان آنرا بعنوان ماهی وسیع خوار و همجنس خوار طبقه بندی نمود.