

Evaluation of the Stocking Success of Rainbow Trout [*Oncorhynchus mykiss* (Walbaum, 1792)] in Çamkoru Pond (Çamlıdere-Ankara)*

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Abstract

The rainbow trout [*Oncorhynchus mykiss* (Walbaum, 1792)] was one of the first introduced species of the inland waters of Turkey. Since 1970s the fish has been stocked in many parts of Turkey, but only a few naturalized populations occur. There are a great number of factors which can influence the success of a rainbow trout stocking project. The study evaluates, the success of rainbow trout stocked into Çamkoru Pond (Çamlıdere-Ankara) in 1997 (n=8000; approximately 8-10 cm total length) by Soğuksu National Parks and Game Wildlife and in 2001 (n=6000; approximately 8-12 cm total length) by Hacettepe University.

*This study is summarized from the first author's MSc Thesis and presented as poster in USG-2007, May, 16-18 2007, Antalya-Turkey.

INTRODUCTION

Many fish species are introduced into the aquatic systems because of different aims like; increasing the amount of species which are important economically or are the food for species concerned, control of unwanted organisms (Aquatic vegetation, Mosquitos, Snails, Blooms of Phytoplankton, other fish) in the aquatic system, decreasing the possibility of reduction in the number of fishery products as a result of environmental interventions such as pollution and hydrogeological changes, and

providing the continuity of wild species or improving the sport facilities [1-3].

Introduction of fish species in Turkey, like elsewhere in the world, has had both positive and negative implications. But the impact of most introductions of fishes is still unknown [4-6].

The rainbow trout were first introduced in Turkey in 1969, and their distribution has continued to expand since the 1970s for sportfishing, mainly in lakes and reservoirs [6]. There are a great number of factors which can influence the success of a rainbow trout stocking Project [7]. The study evaluates, the success of rainbow trout stocked into Çamkoru Pond (Çamlıdere-Ankara) in 1997 [n=8000; approximately 8-10 cm total length (TL)] by Soğuksu National Parks and Game Wildlife and in 2001

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(n=6000; approximately 8-12 cm TL) by Hacettepe University.

MATERIALS AND METHODS

The data analysed in this study evaluate the success of *O. mykiss* stocked in 1997 (n=8000; approximately 8-10 cm TL) by Soğuksu National Parks and Game Wildlife and in 2001 (n=6000; approximately 8-12 cm TL) by Hacettepe University into Çamkoru Pond (7 ha) (Çamlıdere-Ankara). Rainbow trout strain originating from Baldiran National Parks Trout Fish Hatchery Station. Stocking success was measured by survival of the stocked fish. Fish samples were caught monthly with 10,17, 23, 30, 40, 50 mm nets in between August 2002 and August 2003. Identification of species were done according to Geldiay and Balik 1988 [8]. The frequency and the abundance of species was ascertained according to Sisli, 1996 [9].

$$\text{Abundance \%} = [N_i/N_t] \times 100$$

where; N_i is the number of specimens of the species and N_t is the total number of specimens.

$$\text{Frequency \%} = [N_x/N] \times 100$$

where; N_x is the number of samples of the species and N is the total number of samples.

Water Clarity (Secchi), Dissolved Oxygen (YSI Model 51b), Temperature (YSI Model 33a), Electrical conductivity (YSI Model 33a), and pH (Orion Model 230a) were arranged with the measures in open seasons (angling).

RESULTS AND DISCUSSION

The fish species living in Çamkoru Pond, their

Table 1. The fish species living in Çamkoru Pond, their origins and the rank-abundance data.

Family	Species	Origin of Introduction	Year	Number	Number of Individuals			Self Maintaining Populations		
					Total	Abundance %	Rank	Frequency %	Established	Unestablished
<i>Squalius cephalus</i>	Cyprinidae	Native			374	31.19	2	100	X	
<i>Alburnus escherichii</i>	Cyprinidae	Native			308	25.69	3	100	X	
<i>Gobio gobio</i>	Cyprinidae	Native			40	3.34	4	71.43	X	
<i>Tinca tinca</i>	Cyprinidae	Introduced	1993	200	465	38.78	1	100	X	
<i>Cyprinus carpio</i>	Cyprinidae	Introduced	2001	5000	11	0.92	5	28.57		X
				6000						X
			2002	5000						X
			2003	8000	1	0.08	6	7.14		X
<i>Oncorhynchus mykiss</i>	Salmonidae	Introduced	1997	6000						X
			2001	6000						X

origins and the rank-abundance data are given in Table 1. Assessment of rainbow trout stocking program are shown in Table 2.

As in many aquatic systems in the Turkey, rainbow trout have been stocked into Çamkoru Pond to support recreational fisheries. The first introduction of rainbow trout in Çamkoru pond occurred in 1997 with the release of 8000 fingerlings fish. An additional 6000 rainbow trout fingerlings were released back into pond in 2001.

Six fish species, 1199 specimens were captured from netting assessment during the 2002-2003 in Çamkoru Pond. *Tinca tinca* (38.78%) was determined to have the greatest population size followed by *Squalius cephalus* (31.19%), *Alburnus escherichii* (25.69%), *Gobio gobio* (3.34%), *Cyprinus carpio* (0.92%) and *Oncorhynchus mykiss* (0.08%). The introduction of *Tinca tinca* was met with great success but no such success was met with the introduction of *Cyprinus carpio* and *Oncorhynchus mykiss*.

Despite 14000 of rainbow trout being stocked in Çamkoru Pond, the species failed to establish self-sustaining stocks. For introduced trout to establish self-sustaining stocks, suitable living and spawning

areas must be present. The biological, physical and chemical characteristics of the water itself greatly influence post stocking survival [10-15]. There are a lot of records about the factors (poor habitat/water quality, water level fluctuations, predation, prey availability, interspecific competition, intraspecific competition, genetic strain, disease/parasites, hatchery background (diet, condition of fish, rearing techniques, etc), transport stress, stocking practice (frequency, time, rate, age/size, etc.), post stocking weather conditions, emigration of stocked fish) affecting the success of *O. mykiss* stocking throughout the world [7].

In Çamkoru Pond it appears unlikely that the limnological conditions in the pond are limiting rainbow trout. This stocking program did not establish spawning populations. Size of waterbody and water depth were not appropriate survival of this species. High fluctuations of water temperatures were observed between months. Ice formation starts typically at the end of November and ice usually melts in April. Surface temperature was measured greater than 20°C in June, July and August, reaching as high as 24.5°C in July 2003. Low bottom oxygen conditions readings over the study period ranged from 5.1 to 8.5. Secchi depths were lowest (approximately 80 cm) in April and November and they were the deepest (approximately 70 cm) in May. High fluctuations of water levels were observed between seasons. High levels of sedimentation and lack of spawning tributaries had negative effects on Rainbow trout stocking success. Rainbow trout were not acclimated to pond conditions. Transportation procedures and stocking time (month) were different in each stock programme. Failure of rainbow trout survival in the Çamkoru pond depends on complex interaction of more than one factor.

Rainbow trout stocking practices in Turkey has not been changed since 1970. The characteristics and

Table 2. Assessment of rainbow trout stocking program.

Objectives	Parameters	Suitable	Unsuitable
Stocking strategies	Fish density	x	
	Fish size	x	
	Fish strain	x	
	Fish transport		x
	Fish release techniques		x
Environmental conditions	Post stocking weather conditions		x
	Water Quality		x
	Size of waterbody		x
	Spawning places		x
	Interspecific relation		x

environmental requirements of rainbow trout were not investigated. There are some isolated reports of rainbow trout escapes from freshwater fish farms living in rivers [16,17], but there is no evidence to suggest that self-maintaining populations in the inland waters of Turkey have become established. Rainbow trout have evidently been unable to adapt to Turkey conditions.

The species is of great economic importance to fish farms and cage culture stations in Turkey but not for enhancing fish production in natural water bodies. Stocking to enhance recreational fisheries is common practice in Turkey. Stocking programs are expensive endeavors, and minimizing the costs are often attained by use of different stocking strategies and harvest regulations [15]. Economic losses have been continuing for many years as there is not any monitoring or evaluation program of the stocking practices. The habitat of *Salmo trutta abanticus*, *S.t. macrostigma*, *S.t. labrax*, *S. platycephalus* living naturally in Turkey, is getting threatened. Instead of continuing the studies with one of exotic fish species, *O. mykiss* which do not find ideal habitat to establish self-sustaining populations there should be studies with these species supporting conservation and the stocking practices in their regions.

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