

Marsh Frogs, *Rana ridibunda* in Lake Akören -26 August National Park (Afyon): A Preliminary study of Population Size and a Taxonomical Evaluation

Uğur KAYA

Ege Üniversitesi, Fen Fakültesi, Biyoloji Bölümü, Zooloji Anabilim Dalı Bornova-İzmir - TURKEY

Uğur C. ERIŞİMİŞ

Kocatepe Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, Afyon - TURKEY

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Abstract: The population size of marsh frogs, *Rana ridibunda* was estimated using the mark-recapture method in Lake Akören Lake. The triple catch method was used to calculate survival and gains in addition to population size. The population sizes were estimated to be 3016 on the second day, and 3532 on the third day. On the basis of morphological analyses, we concluded that Lake Akören is inhabited by *Rana ridibunda ridibunda*.

Key Words: Marsh frog, *R.r. ridibunda*, Lake Akören, population size, morphology.

Akören Gölü-26 Ağustos Milli Parkı (Afyon) Ova Kurbağaları, *Rana ridibunda*: Populasyon Büyüklüğü Ön Çalışması ve Taksonomik Bir Değerlendirme

Özet: Akören Gölü'ndeki Ova kurbağalarının populasyon büyüklüğü, markalama-tekrar yakalama metodu kullanılarak hesaplanmıştır. Üç kez yakalama metodu kullanılarak populasyon büyüklüğüyle birlikte hayatta kalma ve kazanç da hesaplanmıştır. Araştırmanın ikinci gününe ait populasyon büyüklüğü 3016, üçüncü gününe ait olan ise 3532 olarak hesaplanmıştır. Morfolojik analiz temeline göre Akören Gölü'de *Rana ridibunda ridibunda*'nın yaşadığı tespit edilmiştir.

Anahtar Sözcükler: Ova kurbağası, *R.r. ridibunda*, Akören Gölü, populasyon büyüklüğü, morfoloji

Introduction

Researchers have recently reported declines and extinctions of frog and toad populations throughout the world (1-5). The causes of most population declines are poorly known but habitat destruction is clearly the explanation in many cases. In Queensland, Australia the gastric brooding frog (*Rheobatrachus silus*) and the southern day frog (*Taudactylus diurnis*) were reported to be extinct during the past decades (4, 6). Moreover, fifteen frog species were identified as being seriously in decline (7). Four were listed as threatened and eleven were classified as vulnerable and rare. All these listings and classifications in the Endangered Fauna Act were based on distribution and population size studies.

Some countries are using volunteers to carry out monitoring studies to investigate amphibian populations. They consider such studies an educational tool (8).

No part of Turkey had ever been subjected to a detailed anuran monitoring study. In 1992, Baran et al. (9) sampled the density of frog populations. However, their study included very large areas, twenty nine sites in four different regions about a total of 21 km². The survey was conducted within a short time period, i.e., 54.5 h. In his recent detailed work, Demirsoy (10) classified Turkish anuran taxa using the World Conservation Union's (IUCN) Red Data Book codes as follows: 6 are rare, 17 are widespread and not in danger, 9 are rare/indetermined, 2 are indetermined/insufficiently known, 1 is vulnerable/indetermined, and the last one as indetermined/insufficiently known. Nonmontane *Rana* species were given as rare and indetermined.

We chose this site for our study because Lake Akören (Figure 1) is a part of the 26 August National Park, and according to the park security, commercial frog collectors

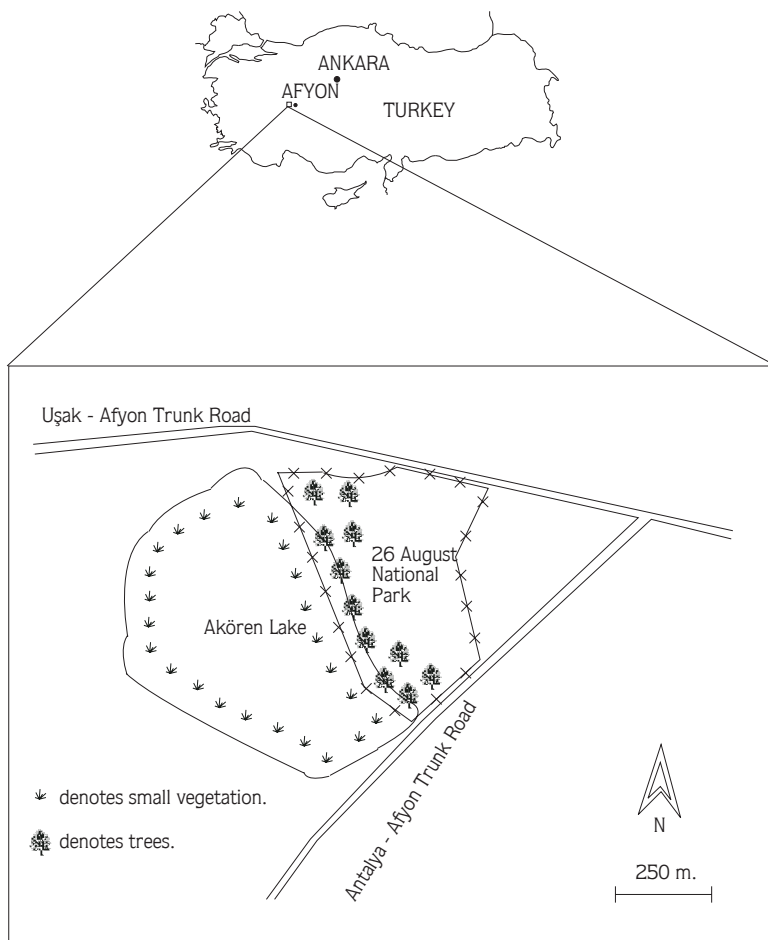


Figure 1. Illustration of the Akören Lake sampling site and the 26 August National Park's border.

have been attempting to collect frogs from the site during recent years.

The main aim for our survey was to estimate population size, and hence to start conservational studies for the future. In addition, we also evaluated all the marked marsh frogs taxonomically, according to their external morphological characters.

Materials and Methods

To estimate the population size of marsh frogs, all individuals were marked, released and recaptured on consecutive days according to Begon's (11) triple catch method. We also used Petersen's (12) method to compare the results with Begon's estimator. Frogs were marked by toe clipping according to the alphanumeric code system proposed by Waichman (13). Our study was conducted on September 2-4th, and took place between

the hours of 8:00 P.M. and 5:00 A.M. The water temperature was 11.5, 12.9 and 15.3°C on consecutive days. The sex of the specimens were determined by the presence/absence of vocal sacs and swollen/normal digitus primus. During our three-day survey, we critically investigated the whole lake's periphery. Snout-vent length (SVL), coloration and sex were recorded for each frog. Measurements were made using a dial caliper to an accuracy of 0.05 mm.

Results and Discussion

Population size

The toe-marked frog population consisted of 40 males, 65 females and 28 undetermined (we used this definition because it was not possible to determine the sex of frogs smaller than 43.4 mm due to lack of swollen digitus primus and vocal sacs) on day 1; 16 males, 83

females and 16 undetermined on day 2; and 16 males, 73 females and 25 undetermined on day 3. The total number of marked frogs accordingly were 133, 115 and 114 on three consecutive days. Of the 115 frogs captured on day 2, 6 frogs had day-1 marks (they were also given day-2 marks). The rest of them were given day-2 marks. one hundred fourteen frogs were captured on day 3, of which 6 had day-1 marks and 3 had day-2 marks. The estimated population size was 3016 on day 2, and the survival rate was 1.37. We assumed that survival and gain rates are constant and the interval between the samples was the same (11). Accordingly, the population size was estimated to be 3532 on day 3. The survival rate and gain were estimated to be 1.37 and -0.17 respectively. We also used Petersen's estimator to calculate population size on days 2 and 3. The results were surprisingly similar on day 2; population size was 2992. On day 3 however, Peterson's estimator result was slightly higher (4370).

The ratio of males to females over the study period was 1:1.6 on day 1, 1:5.2 on day 2 and 1:4.6 on day 3. Sex ratio is an important measure because it is possible to estimate population size from the ratio after counting the calling males in the following years or in other similar biotopes of the same species. Moreover, it is also important to obtain the ratio during different periods of the breeding season because males are more active especially in their breeding season.

Demirsoy (10) has given the current conservational classification of the Turkish frog fauna but provided no substantiating data. Demographic information concerning frog populations in Turkey is lacking. According to present knowledge all the frog species must have legislative protection unless their population sizes and ecology are well known in local distributing ranges. Moreover, investigations of relative abundance and reproductive success of breeding groups in the range of each population is strongly recommended. Long-term monitoring studies are being planned to determine the major factors influencing the population size of frogs in the same biotope and others as well.

Taxonomical evaluation

Marsh frogs are common in Turkey, extending from west to east as well as south to north. Previously it was accepted as a homogenous species in Turkey (14-16). In 1988, however, Arıkan (17) established the presence of

a new subspecies, *Rana ridibunda caralitana*, from Lake Beysehir which was formerly noted by Bodenheimer (14). In more recent studies, the distribution range of this subspecies has been extended in western (18) and eastern Anatolia (19).

According to their bioacoustic and enzyme studies, Joermann et al., (20) generally classified the western Turkish marsh frog populations as *Rana levantina*, which was first described from Israel (21). Beerli et al., (22) name Lake Beysehir populations as *Rana bedriagae* and accept the former names, *Rana ridibunda caralitana* and *Rana levantina* as synonyms. The controversial debates on the taxonomy of marsh frog populations not only take place in Turkey. Marsh frogs inhabiting Lake Shkoder (Yugoslavia) were named as *Rana shqipericana* (22). Schneider and Joermann (23) regarded these forms as intermediate hybrids of *R. ridibunda* and *R. lessonae* on the basis of their bioacoustic analysis and comparison with the other ranid calls.

Male frogs in Lake Akören ranged in size (SVL) from 46.3 mm to 120.8 mm (Mean: 74.27, SD: 18.23), and female frogs ranged in size from 43.7 mm to 121.8 mm (Mean: 57.70, SD: 14.24). Dorsal coloration of the marked marsh frogs of Lake Akören was light green to brown with varied colored spots. Coloration of the whole venter, including the head and extremities, was dirty white without any colored spots in the 302 frogs (Figure 2). Only 12 frogs had light or dark green spotted venters including the gular area. The rest of the frogs have small green marks on the gular area. When we evaluate our morphological findings in the light of previous studies, our samples belong to the nominate subspecies, *Rana*

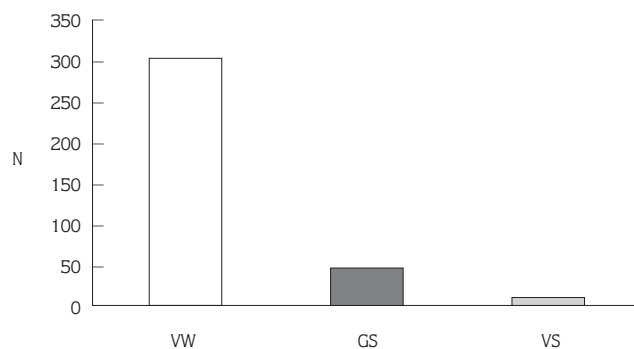


Figure 2. Venter types. WW: Dirty white venter without any colored spots. GS: Small green marks only on the gular area. VS: Green spotted venter including gular area. N: Total number.

ridibunda ridibunda. Even though attempting to identify individual marsh frogs on the basis of morphology has not been generally accepted by various authors (24, 25), there are prominent morphological differences in the Anatolian Lakes District marsh frogs compared to our specimens. None of our specimens have orange maculated venters as seen in *Rana ridibunda caralitana*.

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