

## Temporal occurrence of the toad *Bufo viridis* (laurenti, 1768) in desert harsh terraria at Safwan-south Iraq.

Mohammed Jasim Sajit and Usamah Hamid Yousif

Basrah University, College of Science, Ecology Dept.

Email: [usamahyousif@yahoo.com](mailto:usamahyousif@yahoo.com)

### ABSTRACT

*Bufo viridis* (laurenti, 1768) specimens were recorded at Safwan at the southwest Basrah province, Iraq. Safwan is a desert village depending on underground water for irrigation. Specimens were collected monthly for the period from November 2017 to October 2018 by a hand net. A total of 29 specimens were collected for seven months (October – April). The highest number of recorded individuals was ten in November. The species was recorded within a range of air temperatures between 22°C in April and 34°C in November. Water temperature also limits its occurrence to a range of 12°C in March and 21.3°C in November. Salinity ranged between 9.01 and 9.5ppt and pH between 6.82 and 7.49.

Keywords: herpetofauna, amphibians, Basrah, desert, underground water, *Bufo viridis*

### INTRODUCTION:

Amphibians are widely used as ecological and biological species indicators to assess the condition of the environment. They are susceptible animals and react very rapidly to substantial changes in their environments. They also form vital parts of the ecosystems they belong to (Sabri *et al.*, 2017).

There is a decline of amphibian populations across the

globe since the 1950s, and the environmental impact was suggested to be one of the factors causing this decline (Wyman, 1990; Houlahan *et al.*, 2000). The results of Houlahan *et al.* (2000) globally indicated a relatively rapid decline from the early fifties to the late sixties of the last century, followed by a reduced rate of decline to the beginning of this century.

The total number of amphibian species recorded in Iraq were ten

species belonging to five families (Al-Barazengy *et al.*, 2015).

The European green toad (*B. viridis*) is found in most of Europe and the surrounding areas. It is not as delicate as most frogs are and they tend to survive in harsh environments, in freezing temperatures, and during hot and dry summers. It is also not as vulnerable to habitat loss as the majority of frogs worldwide. Like most of their kin, European green toads produce Bufotoxin and are poisonous.

(<https://teleonomix.com/2015/10/30/european-green-toad/>).

Litvinchuk *et al.* (2011) found that *Bofotes* species inhabits several habitats in central Asia depending on their ploidy levels. Polyploid species occur in regions with harsher climatic conditions (higher latitudes, elevations, etc.). The diploid species inhabit the arid lowlands (from 44 to 789 m above sea level). In comparison, tetraploid was recorded in mountainous regions (340–3492 m a.s.l.) with usually lower temperatures and higher precipitation rates than in the region inhabited by diploid species. The triploid species was found in the Pamirs (Tajikistan) at the highest altitudes (2503–3859 m a.s.l.) under the harshest climatic conditions.

Vlček *et al.* (2013) mentioned that the exact borders of *Bufotes viridis* distribution still unknown.

It is found on the majority of large Mediterranean islands, including numerous Croatian ones as well.

It has been found that *B. viridis* is widely distributed in Europe, North Africa, some Mediterranean Islands, middle east and Arabian Peninsula (Litvinchuk *et al.*, 2011).

Despite the ecological importance of amphibians, they received little scientific attention in Iraq. There were some previous lists for Iraqi amphibians Allouse (1955), Khalaf (1959), Mahdi and Georg (1969); Amr (2009); Garstecki & Amr (2011) and others on the record of some amphibians like Afrasiab & Ali (1988); Al-Sheikhly *et al.* (2013); Kevork (1972); Reed and Hymen (1959); Weber (1960) beside several studies on the amphibian parasites.

There were no previous amphibian's surveys for Basrah province except that of the desk study of Garstecki & Amr (2011) on Iraqi marshes. *B. viridis* was recorded in Iraq by Afrasiab and Ali (1988) on specimens in the Iraq Natural History Research Center and Museum. Most of the work on this species is about its parasites like Jasim (2008); Mohammad *et al.* (2015) in Aldiwania south Iraq; Dauood (1974) in Nineveh, Al-Barwari and Nassir (1988) in Baghdad Al-Alousi (1994) in Nineveh.

It has been also recorded in Iran by Stöck et al. (2001); Nokhbatolfoghahai, (2009) and Borkin *et al.* (2001).

In this study, we reported the occurrence of *B. viridis* in Basrah province for the first time with notes on the relationship of its temporal occurrence with environmental conditions.

#### MATERIALS AND METHODS:

The specimens were collected monthly through the period from November 2017 to October 2018 from an agricultural plant nursery. The study area ( $30^{\circ} 06'$

$54''$  N  $47^{\circ} 40' 15''$  E) is located in the desert in Safwan district 50 km. Southwest Basra province south of Iraq (fig. 1). Safwan city is surrounded by desert and depending on groundwater for irrigation. Toads were counted in the area, and samples were collected by hand net then preserved in ice for further morphometric measurements. Air and water temperatures were recorded by mercury thermometer, TRI-METER pH /EC-983 recorded pH and conductivity, and converted to salinity. Samples were photographed in situ by the Nikon D5300 camera.

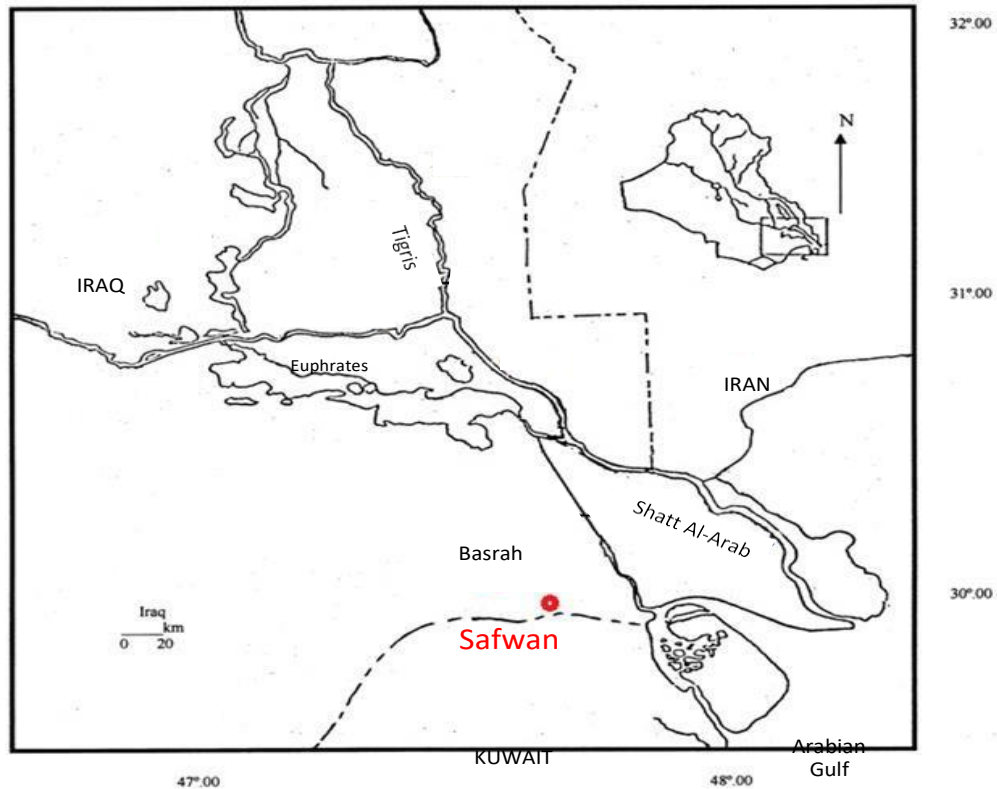


Fig. (1): Map showing the sampling area at Safwan south of Basrah province.

Snout-vent length (SVL), fore and hind limb lengths, Parotoid gland length and width, Eye diameter, Tympanum diameter, Space between eyes were measured in millimeters. The body weight in grams was recorded too. Specimens were identified according to Afrasiab and Ali (1988); Stöck *et al.*, (2006); Colliard *et al.* (2010) and Mikula (2015).

We collected 29 individuals of *B. viridis* from Safwan district through the period November 2017 to October 2018. They were found under rocks, grasses, or in the irrigation channels. The highest activity of the species was during October; then it was less active

during November and September, but it was very inactive during the period January to April.

The specimens were characterized by the absence of tail, warty skin, maxillary teeth absent, tympanum present, and parotid glands bigger than upper eyelid (figs. 2a, b, c).

The morphometric characteristics of the investigated species are presented in table (1). It shows that the Parotoid gland length is almost twice the Eye diameter, but its width is almost the same as the eye diameter. Hind limbs are smaller than SVL and foot length. Foot length is as long as SVL. The relationship between body weight and SVL is:

$$W=1.3174L^{1.5595}$$

Where w= body weight in gm. and L= SVL in cm.

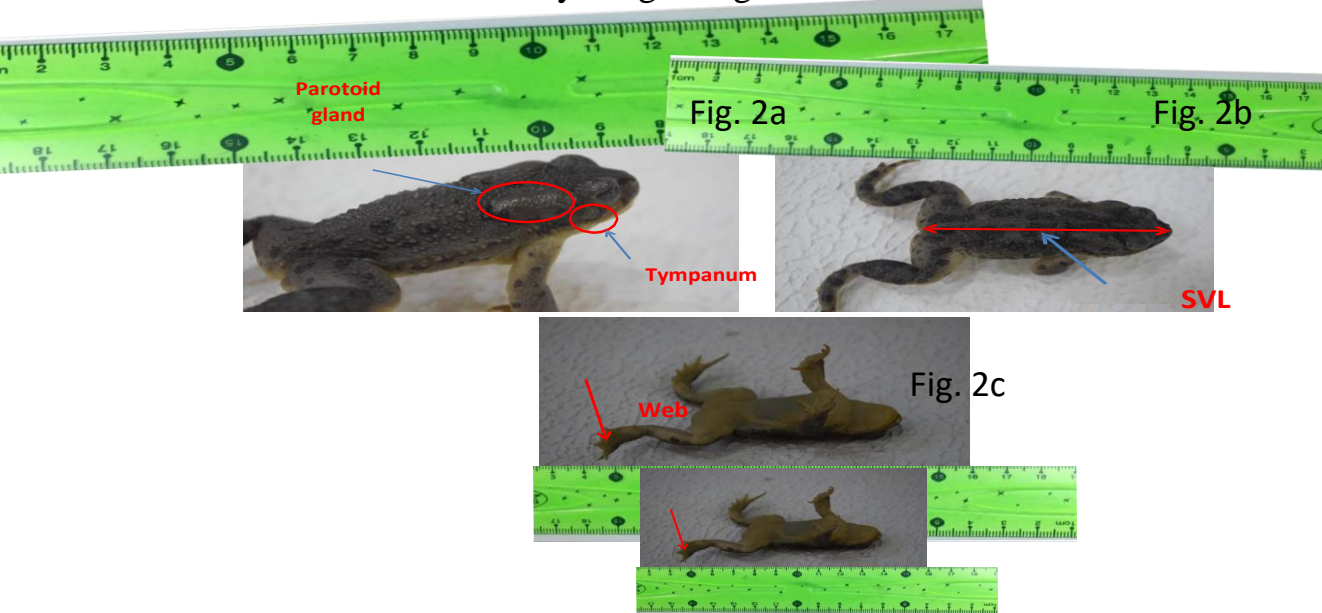


Fig. 2: Some morphometric characteristics of *B. viridis*.

Table (1): Mean, minimum, maximum, and standard deviation(SD) values of morphometric characters measured in *B. viridis*.

Characters	Range	Mean	±SD
SVL Snout ventral length (mm)	60-69	64.38	2.77
hind limb length (mm)	60-74	66.48	3.84
Forelimb length (mm)	30-46	38.48	4.37
Parotoid gland length (mm)	12-16.6	14.12	1.24
Parotoid gland width (mm)	6-8.4	7.18	0.67
Eye diameter (mm)	6-8.2	7.15	0.74
Tympanum diameter (mm)	3-4.1	3.70	0.35
inter orbital length (mm)	5-9.4	7.39	1.34
Body weight (gm)	18-29	23.97	3.18
Parotoid gland length/ Eye diameter		1.975	
Parotoid gland width / Eye diameter		1.004	
Tympanum diameter/ Eye diameter		0.517	
hind length/SVL		1.033	
fore limb length/SVL		0.598	
fore limb length/ hind length		0.579	

Air temperature varied in the sampling area between 47°C in August to 18.1°C in February. Specimen occurrence was recorded in only a certain range of air temperatures ranging from 18.1°C in August. We recorded only one specimen, and it was inactive and hiding in a plastic

container and 34°C in October, where we recorded only 3 specimens (fig.5). The correlation coefficient between air temperature and species occurrence was  $R^2 = -0.229$ , with standard deviation of 17.05.

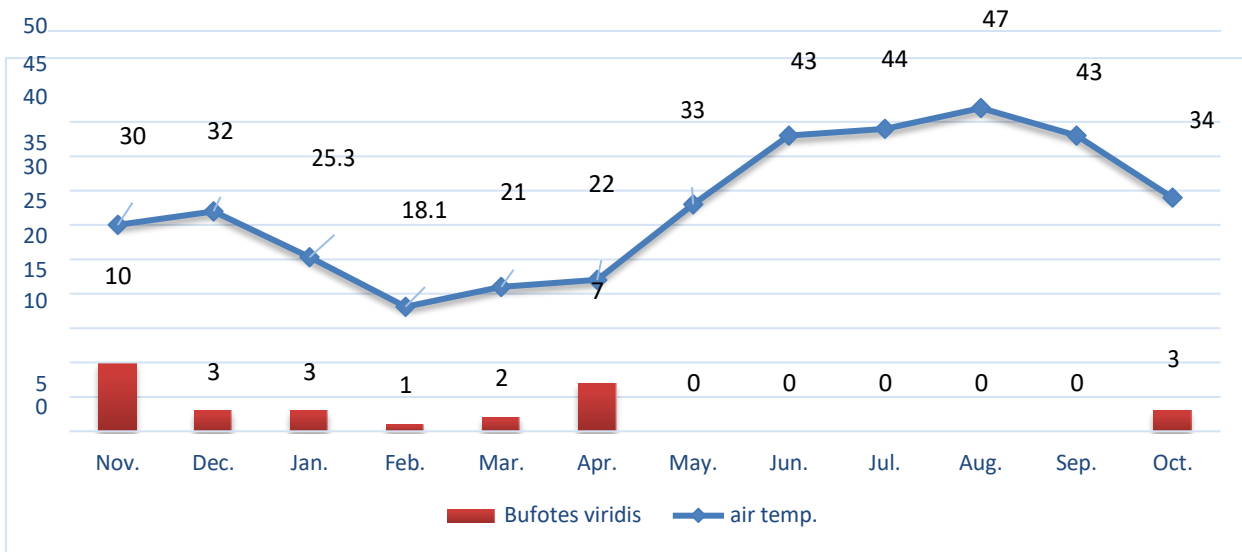


Fig. (3): Air temperature (°C) and related occurrence of *B. viridis* in the study area.

Water temperature varied from 38°C in August to 12°C in March (Fig. 6). The occurrence of *B. viridis* (Fig. 6) was correlated to the water temperature ranges of 12°C (2 individuals) to 27°C (3 individuals), while the maximum number of individuals recorded

was at November (21.3°C). The species showed very low activity correlated to low water temperature. The correlation between water temperature and species occurrence was ( $R^2 = -0.309$ ), with a standard deviation of 13.22.

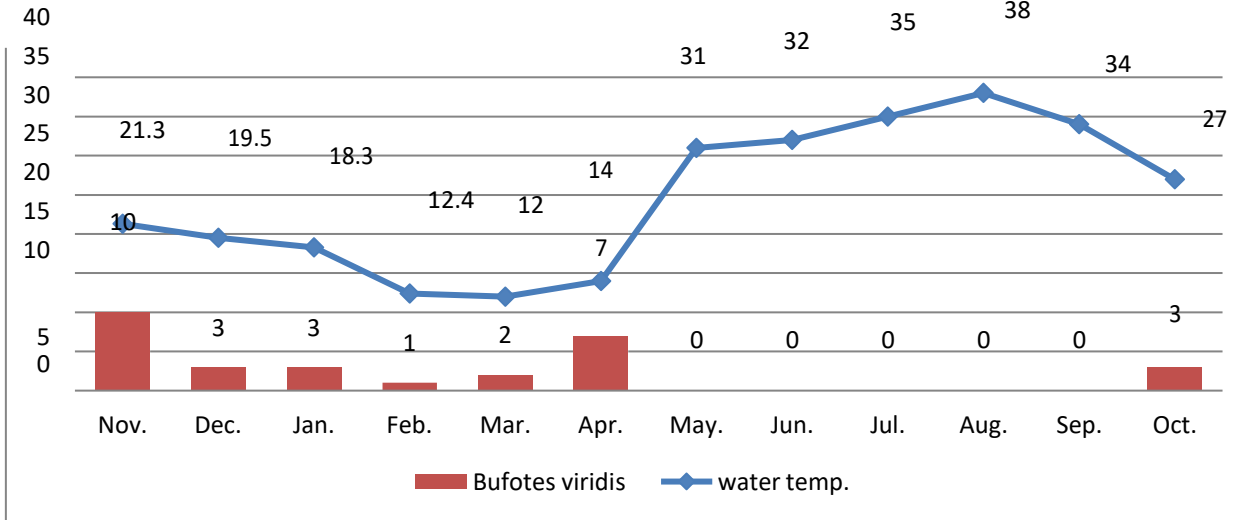


Fig. (4): Water temperature (°C) and related occurrence of *B. viridis* in the study area.

The pH recorded in the area ranges from 6.82 in February to 7.49 in August (SD= 0.207839). It tends to be slightly acidic during March and April (Fig. 7) while it

was slightly alkaline during the rest of the year. There was a very low correlation ( $R^2 = -0.08$ ) between the species occurrence and pH.

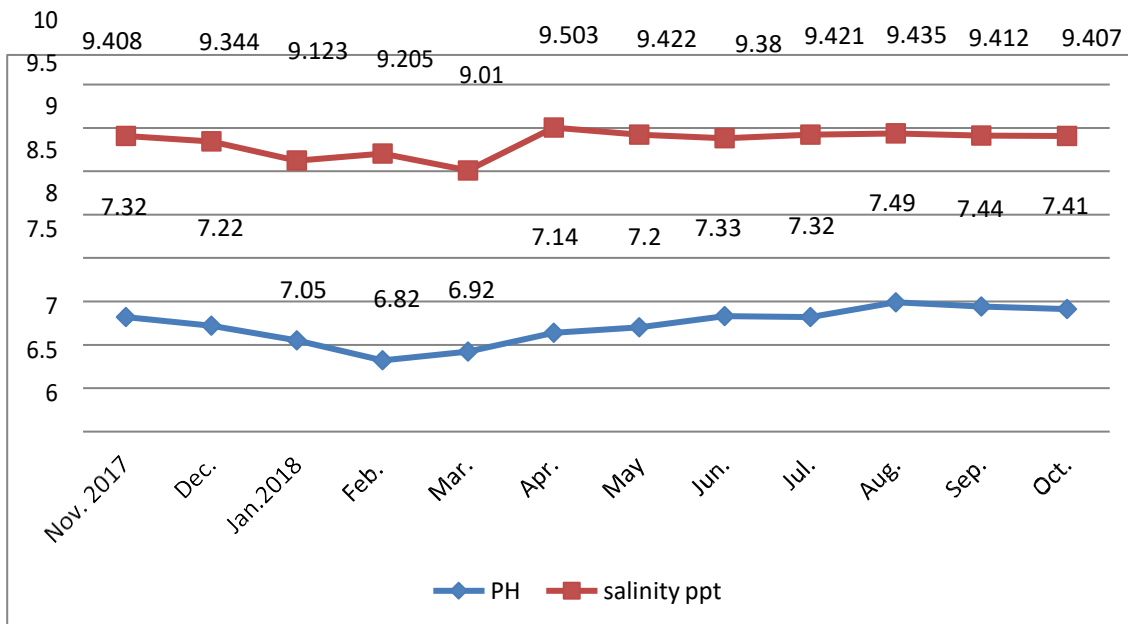


Fig. (5): Monthly salinity and pH of the studied area.

Salinity also showed a slight difference (SD= 0.147401) between months. It ranged between 9.01ppt in March and 9.503ppt in April (fig. 7). The correlation between the occurrence of the species and salinity was low ( $R^2= 0.12$ ).

## DISCUSSION

The characteristics of the species recorded in Safwan were identical to that of the same species characteristics mentioned by Afrasiab and Ali (1988); Stöck *et al.*, (2006); Colliard *et al.* (2010) and Mikula (2015).

The species is considered to be one of the amphibians that can tolerate salinities higher than 9ppt. and could be acclimatized to salinities up to 80% of seawater which equals to 28ppt. (Katz, 1973). It seems that this species can tolerate the salinity range (9.01-9.503ppt) in the area. The high recorded salinity is compatible with AL-Rkaby (2005), who found that Boron's high concentrations characterize these wells. The slight drop in salinity during January to February might be due to the rain mixing with the irrigation water.

The reduction in pH values from January to march is due to

The phytoplankton did not consume CO<sub>2</sub> because of the low intensity of sunlight that reduces the photosynthesis or might be due to underground water quality. There might be another reason for reducing pH in these months due to the acidic rain because the area is affected by the burning of natural gases produced from oil wells.

The species' behavior differs with temperature variations. It disappears during summer (aestivation) with temperatures equals and exceeds 31°C while inactive at a temperature of less than 12.4°C. This behavior is normal because it was found that some amphibians aestivate during the hot dry season by moving underground where it is cooler and more humid. They may aestivate to conserve energy when its food and water supply is low. (Moore, 2009). The water-holding frog has an aestivation cycle. It buries itself in the sandy ground in a secreted, water-tight mucus cocoon during hot, dry weather periods. Australian Aborigines dig for these frogs to consume the water preserved in their bodies during hot, dry seasons (Pough *et al.*, 2001).

*B. viridis* inhabits most habitats, including *grasslands*, forests, deserts, gardens, or any wetland and is considered to be the



Most amphibians can tolerate dry conditions than any other amphibian (Vlček *et al.*, 2013). It seems that *B. viridis* could occupy a harsh desert environment.

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### المستخلص

تم جمع نماذج العُلجوم (*Bufotes viridis* (laurenti 1768), شهريا للمدة من تشرين الثاني 2017 لغاية تشرين الاول 2018 في منطقة سفوان جنوب غرب محافظة البصرة. تعتبر سفوان قرية صحراوية تعتمد على المياه الجوفية للري. تم جمع 29 نموذجا ظهرت خلال سبعة اشهر فقط من تشرين اول الى نيسان. اعتمدت الصفات المظهرية للتعرف على النوع. ظهر النوع ضمن مدى درجة حرارة هواء تراوحت بين 22°م في نيسان و34°م في تشرين الثاني بينما كان مدى الظهور في درجات حرارة الماء بين 12°م في اذار و 21.3°م في تشرين الثاني. تراوحت الملوحة بين 9.01-9.5 جزء بالألف والاس الهيدروجيني (pH) بين 6.82-7.49.