



***THE IN-SITU AND EX-SITU  
CONSERVATION MEASURES  
FOR THE ENDEMIC LIZARDS,  
EREMIAS ARGUTA  
TRANSCAUCASICA***



**Booster Grant**

**DETAILED FINAL  
REPORT**

Application ID 16766-B

**Marine Arakelyan**

Yerevan, 2016

## Introduction

### Conservation situation

*Eremias arguta transcaucasica* an endangered subspecies occurring in very low numbers only in Armenia, away from the species main range. Listed in the IUCN Red List of Threatened Species (ver. 3.1) as Critically Endangered CR A2c. According to IUCN criteria categorized as Critically Endangered CR A2c; B2ab (ii,iii). The only population known from Armenia lives on the southern shoreline of the Lake Sevan near the Noratuz village. (Red Book Armenia, 2011).

### Goal

In order to ensure the survival of *Eremias arguta transcaucasica* in Armenia, the breeding program, reintroduction, translocation and reconstruction of its natural habitat have to be taken urgently. The scientific monitoring and raising public awareness are important part of this conservation project.

### Evaluation of alternatives to translocation/reintroduction

In spite of our efforts, we could not find any other *Eremias arguta* populations along Sevan Lake. This is likely to be a consequence of the fact that the majority of the species' natural habitat has been destroyed. Our surveys in the vicinity of the extant population as well as historical places formerly occupied by this species have shown that most of the areas were transformed to city/villages or used as agriculture land. The remaining population occupy area less than 0.5 km<sup>2</sup> and there is continuing decline in its area of occupancy, in the quality of its habitat and in the number of mature individuals. Thus, the captive breeding program, translocation and reintroduction plan is essential for protection of this species.

## Actions:

The following actions were undertaken in framework of this project

1. Launching the ex-situ conservation program
2. Developing in-situ conservation measures
3. Preparing the reintroduction plan
4. Public awareness

## Acknowledgments

We thank Mr. Joseph Genovese (owner of American Bred Reptiles and director of American Steppe Runner Conservation), Dr. Dušan Jelić (Croatian Institute for Biodiversity), Mr. Vasil Ananyan (WWF-Armenia) and Mr. Karen Martirosyan (Zoo of Yerevan) for help received during implementation of this project and sharing with their experiences in reptiles' captive breeding program.

## Implementation

### *Ex-situ conservation. Captive breeding program*

Our captive breeding program was implemented to promote the protection of rare subspecies of *E. arguta transcaucasica* which located on one small patch in mountain steppe on shore of Sevan Lake. For this aim a new laboratory at Faculty of Biology of Yerevan State University was established and equipped by terrariums, incubator, plastic boxes, lizards' food supply (crickets, mealworms, and cockroaches), etc. in 2015 - 2016. Carefully considering the impact of our captive breeding program on wild population we decided during the first experimental year to collect a few number of lizards.

The 5 pregnant females (64 – 70 mm of body length) were caught in field in May 26 and June 1, 2016 and transported to laboratory. Each female was held in separate tank with sand from Sevan Lake shore. 4 of 5 females were laid the eggs. We kept adult animals in laboratory two week after that they were released at sites of their captured. We didn't hold adults more than two weeks and released all lizards including the one pregnant female. The females after egg-laying were thin and wrinkled. These were laid the eggs in 8 June, 9 June and 13 of June in sand. Eggs were examined and separated each from its neighbor on special plates with sterilized sand and soil as substrate. Then the eggs have been inputted in reptilian incubator and held at a temperature + 28°C ( $\pm 2^\circ$ ) and 60-70% of humidity. The substrate was remoistened periodically.

Eggs were inspected daily. The clutch which was incubated on soil were affected by mould and died. All next clutches were held on sand and survive. The period of incubation was 45-47 days. Of the 15 eggs, one was ruptured, two were infertile, 6 affected by mould and 6 produced normal hatchling. The hatchlings had SVL 27.6 -28.2 mm. Hatchlings were housed in small boxes (15 x 20 cm) with shelters. After one month when hatchlings had grown, they were transferred to terrariums. Hatchlings began to feed 4 days after emergence from eggs. The small crickets, mealworms dusted by calcium and D3 vitamin were fed the hatchlings. The lizards had skin shedding 3 times: the first at 15-18 July after one month of emergence from eggs, second in period September 9-15 and third - October 14- 20. We have generated the protocol for next captive breeding process. To ensure the long-term implementation of breeding program of lizards, the new captive breeding laboratory is based in Faculty of Biology and will partly supported by recourses of Yerevan State University.

The ex-situ conservation would have a sufficient result in saving a species only together with implementation of in-situ conservation aimed to preserve, improve the nature sites of their habitats where we will release the captive-bred lizards.





**Figure 1. The new reptiles' captive breeding laboratory (laboratory, emerging from egg, juvenile at the second skin shedding etc.)**

## *In-situ conservation*

The current distribution of *E. arguta transcaucasica* is separated by large areas of agriculture and found in degraded lands. Additionally, during monitoring of 2015-2016 was noted that the number of competitor large green lizards (*Lacerta strigata*) has grown which increase the pressure on ecologically similar the endemic lizards in places where the species coexist. Together with ongoing process of habitat destruction it likely to cause further extinction of population of *E. arguta* in this area.

In framework of in-situ conservation program we have prepared a document of justification for conservation of this rare species. As result this document as well as recommendations about species management plan for *E. arguta* have been included in Management Plan of Sevan National Park which was published in 2016.

We had attempts to restoration of natural habitat in place of lizards' distribution. We had no success here because of intensive using of this territory by human and overgrazing which destroyed all our shelters for lizards. Thus, we decided not spend more efforts on restoration of current habitat and have rejected from plan of translocation of lizards in area of Norartuz village. Instead of that, we made more attempts to find a new place for reintroduction in area with lower human impact. For this we in detail studied the maps according to ecological preference of this species on base of previous researches. Finally, we made choose the area in vicinity of Lichk villages (Fig 2) in place of historical habitat of lizards, where still remain sandy soils suitable for lizards. This site may be the correct place for lizards' reintroduction without any habitat restoration efforts. Prior to this study *E. arguta* had not been recorded for almost 80 years and have been reported as extinct in this region. However, we were pleasantly surprised when happened upon to meet the single individual of steppe runner lizard near of Lichk village in place where we are planning to release the captive bred lizards. This is mean that we have made a perfect choice of the place for establishment of a new protected population.



**Figure 2. The sites of current population of *E. arguta* and establishment of a new population**

We have a preliminary agreement with local authority of Lichk village about using of 10 hectares of land belonging to village to install a protected area. On this territory we plan to release the lizards in order to establish a new protected population. The lizards for reintroduction mostly will breed in captivity, and then captive-born steppe runner lizards will release here during next years. Risk and outcome assessment and continuing management would be implemented for successful reintroduction of lizards on this area.

### **Monitoring data**

From 2008 up to 2016 we made monitoring census on territory of habitat of *E. arguta*. For monitoring current distribution lizards we collected the GPS points of lizards and then inserted the records to Arc GIS 10.2 software to calculate the area of distribution of lizards. The area which outline the most extreme marked points of lizards in 2015 was made up 40.5 hectares. Thus in comparing with data of surveys of 2008-2009 with data of 2011-2012 had shown that the area of population was increased from 25 ha till 42 ha. However during survey of 2015-2016 we did not find the lizards on edge zones noted in 2008-2009.



Thus, the main area of distribution is located on degraded land surrounding by agriculture fields and occupies 30 hectares (Fig. 3).



**Figure 3. The points of distribution of *E. arguta* in 2015-2016 year.**

The census was made according to standard method of counting of the lizards on 25 experimental plots (20 x 20 m) which was used in previous researches. The comparative table of number of lizards on experimental plots is presented in table 1.

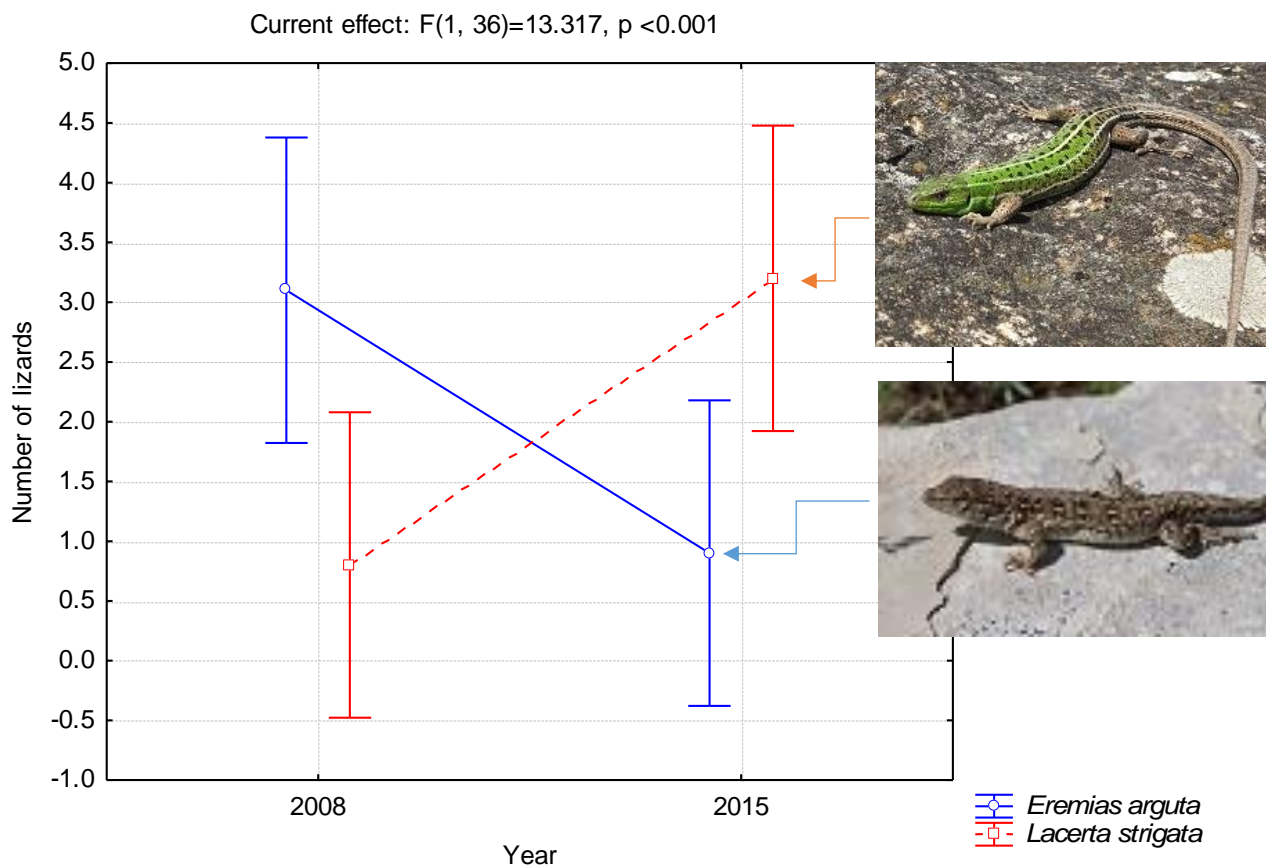
**Table 1. Density estimations for population of *E. arguta*.**

Period of census	Total lizards	Individuals/ha
September 12-15, 2008	85	70
September 12-18, 2011	46	42
September 23 – 26, 2015	38	23
June 5-8, 2009	21	36
June 1-5, 2012	14	11
June 1-5, 2016	24	15

From our monitoring data is clearly seen a trend of decreasing of number of *E. arguta* in population.



We have revealed, that one of the reason of drastic reducing of the number of lizards is a competition with other species of green lizards, *Lacerta strigata* - a large lizard with ecological similar requirements. Moreover, the adults of green lizard prey on young individuals of *E. arguta*. According to results of our census of lizards on experimental plots, the population of steppe racerunner lizard declined 3 times in the period of 2008-2015, while the population of the competing striated green lizard increased proportionally - 3 times. (Fig 4). Thus, the mean of number of lizards on 10 plots from central part of population in fall 2008 was 3.2 for *E. arguta* and 0.8 for *L. strigata*; while in 2015 the mean of lizards on 10 plots from the same area was 0.9 for *E. arguta* and 3.2 for *L. strigata*.



**Figure 4. The means and 0.95 confidence intervals of number of two species of lizards on 10 plots in the core area of *E. arguta* (MANOVA)**

Thus our monitoring results have shown that on survival rate of *E. arguta* plus to anthropogenic press have been added a biological factor – the competition with *Lacerta strigata* lizards.

## **Education and public awareness**

Environmental awareness is one of the essential part of this project. Awareness raising campaigns among students and schoolchildren are successful when it submitted in an complex actions. We chose the World Animal Days environmental “holiday” in 2015 and 2016 for organizing the environmental awareness campaigns. Within the context of these events, during 28 September – 4 October in 2015 we organized the 3 days field practicum for students of Faculty Biology from different levels on topic “The methods of study and conservation of vertebrate animals” at Sevan Lake National Park. The students have learned and practiced the different methods of study of vertebrates in nature and helped in survey of target species of lizard. The group of volunteers was involved in survey of large areas for detection the distribution area of this rare species of lizard. After returning to city the seminar for wide audience was organized. The Center of Zoology and Hydrobiology of Armenia, WWF-Armenia, Faculty of Biology as well as our guests from Institute of Mammals of Polish Academy of Science have shown their achievements in study of biodiversity and its conservation. The next actions promoting the public awareness was organization of exhibition of handmade crafts “Animals in my view”. Among participants were children and students. The three best works received the prizes. Moreover, we invited the schoolchildren from six schools in city and Lichk village to Faculty of Biology to show the animals and tell about the importance of their protection. More information on site <https://youtu.be/41OQ0JAFXus>

In 2016 we continued the events devoted to celebration of World Animal Day during 30 September – 4 October. We organized 3 days field practicum for students to Vayots Dzor area, seminar in Yerevan State University, photographic competition “Animals in one flash”. Special attention was paid to schoolchildren, who participated in the events and visited the Faculty of Biology. The excursion for schoolchildren to forest was organized in 12 of September where they for the first time kept in hand the lizards and frogs, recognized the differences in songs of birds and amazed from beauty of nature.

The in-situ and ex-situ conservation measures for endemic lizards,  
*Eremias arguta transcaucasica*.

We believe that educated public can be one of the most powerful achievements in the process of protection of nature.



Figure 5. Environmental education activities for students of Yerevan State University (participation in competitions, field practicums, seminars in Yerevan State University)





**Figure 6. Enhancing environmental awareness among schoolchildren (participation in competitions, field trip, meetings in Yerevan State University)**