

# Final Report



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**“Development and implementation of conservation measures for an unique lizard population: the racerunner *Eremias arguta transcaucasica* in Armenia”.**



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## Project background

In Armenia steppe racerunner lizards - *Eremias arguta transcaucasica* Darevsky, 1953, is known from only one locality at south west coast of Lake Sevan. It is one of the rarest and most endangered reptiles' species in Armenia, which is on the verge of extinction. The area of habitat of lizards now is seriously threatened by agriculture and urbanization.

Previously racerunners were known from four localities, which are extinct because of habitat destruction. Originally, this endemic subspecies of the steppe-runner was described from the vicinities of the Martuni city (Darevsky, 1953), but in subsequent years intense anthropic development has led to disappearance of this lizard in this and few other localities. Luckily, 27 individuals were relocated by I. Darevsky and F. Danielyan in 1961 from the Martuni surroundings to the site located 20 km away from the Gavar city. Apparently, during the past 37 years steppe-runners have colonized the lake shoreline and established new stable population of 80 - 150 individuals, but their habitat were later swept down by sand mining and this subspecies was thought extinct for Armenia. Prior to this study it had not been recorded for almost 10 years and had been reported as extinct for Armenia. In 2006 a population of lizards was rediscover in a restricted grassland area near the Lake Sevan about 5 km away from the previously known populations. The surveys conducted in 2008-2009 have revealed an alarming status of this

vestigial population as it is significantly fragmented and patches have been continuously destroyed by agriculture.

*Eremias arguta* is a widespread species, distributed from the Danube Delta in the West to west China in the East, and from north Kazakhstan in the North to northeastern Iran in the South. However the Armenian population is isolated from the main distribution area and differs from the other populations by habitat type. The long term isolation could be the cause of the significant differences in their morphology. On morphological base the population from Sevan Lake Valley was described as *E. arguta transcaucasica* by I. S. Darevsky in 1953. Sczcerbak (1974) also noticed the specificity of the Georgian and Azerbaijani populations from eastern Transcaucasia and the differences from the Sevan form. The preliminary molecular studies (cytochrome b sequencing of mDNA) have shown that the Armenian population showed some divergence from the other ones. Lizards from Armenia and eastern Azerbaijan form one clade despite the distance between the localities, isolated from each other, and divided in two subclades. Vast distances between the Armenian population (terra typica of *E. a. transcaucasica*) and the Azerbaijan population ( $TN = 0.059$ ) indicate wide geographical isolation of the Sevan Lake population as well as an old differentiation in the Transcaucasian population of *Eremias arguta* (Pyarkov et al., unpublished data, Orlova et al., 2007, 2008).

The steppe racerunner mostly inhabits steppic regions with wormwood plants. This species is usual found at the sea level elevation in sand dunes and sand beaches. The area in which the steppic Armenian subspecies lives is

located at an altitude of 1920- 2000 m above sea level in mountain steppe characterized by xerophytes plants. This population is an exception living *E. arguta* in high mountain habitat. The severe climate on this high elevation, long term isolation, and habitat peculiarity has probably changed the typical seasonal and daily activity patterns of this species, habitat use, activity temperatures, which could lead to the speciation.

Thus, the only known population of Lake Sevan area is unique and distinctive. It would be worth to include this population in the list of Evolution Significant Units when considering conservation action. In IUCN red list this species is listed in category of Near Threatened, however the endemic population of *E. a. transcaucasica* could be moved to the category “Critical Endangered”, representing an important unit of the species living in a restricted territory and therefore in need of urgent protection. From scientific researches of their ecology, systematic and zoogeography, for example the ways of penetrations of this species on territory of Armenia, we will know about past geology, climate change and ways of zoogeographical occupation of new territories by species (Darevsky, 1957, 1959). However, first of all, we need save these lizards from extinction, which are on edge of extinction, which is the main aim of this project.

## **Project goal and objectives**

The proposed recovery plan for this species will include the following main activities:

- Environmental education plans in order to increase the level of public awareness on biodiversity with the support of the “Young Biologists Association” NGO
- Monitoring of the wild population
- Definition of the pre-conditions for the creation of a new protected population in the vicinity of the maternal one in the Sevan National Park area.

The proposed project was develop the next steps of protection of endangered species and was include following activities:

1. Raising public awareness and implementation of environmental educational programs among local people. Educational program among locals was include five seminars in schools, publication and distribution of booklets, calendars and posters;

2. Collection of additional data on microhabitat preference and monitoring of the existing wild population.

Lizard census: lizards count on a random square basis. Sex, snout-vent length and body mass will be recorded for all captured lizards as well as faeces will be collected in order to determine diet composition. Habitats description will include collection and identification of plant species,

invertebrate sampling, soil analyses, and temperature - humidity records in the lizards' activity period; Soil samples were collected within random squares. Mechanical composition of soil samples was measured. Each 500 g sample was sieved with set of aluminum sieves. The sieves with the following pore diameters were used (0.22; 1; 1.2; 1.5; 1.7; 2; 2.5; 3 mm). Contents of each sieve were balanced with analytical balance.

3. Surveys of the adjoining territories, searching for areas with suitable habitat and climatic conditions for the eventual translocation of lizards

4. Laboratory analysis includes: identification of lizards diet components, vegetation composition, soil structure

5. Precise geographical definition (land use included) of source population area and the newly identified area:

6. Preparation of a detailed description of the procedures and methods which will be used for the translocation supplied by analysis of risk:

7. Production of scientific articles and recommendations to the Ministry of Nature Protection, local authorities and other stakeholders.





*Fig 1. Eremias arguta transcaucasica from Armenia*

## **Progress in objectives achieving**

### ***Field investigation***

Throughout the months of September 2011 and May- June 2012, a team of volunteers from Faculty of Biology of Yerevan State University were attempted to survey the biodiversity of shore of Sevan Lake in vicinity of the habitat of the endangered lizard species . The one day surveys in the period from June 2011 till June 2012 covered the entire south-west bank of Sevan Lake.

The primer aim was to estimate the current status of the population and prepare a scientific sound ground for the translocation plan of these lizards to be placed in location where will care out proper protection measures according to the legislative, administrative, cultural and economic frameworks.

## Monitoring of population size

We estimate the population size during September of 2011 and June 2012 and compare them with the data of 2008-2009 censuses. The results are represented in table 1.

Thus the comparison of census of population size during last two year has shown that the density of lizards is decreased. Natural factors that can affect population fluctuations as environmental changes, food availability, habitat change, parasite, and predation. Moreover, the studied population undergoes strong human pressure which can also act negatively on this population. In any cases it is not sure that a sustainable development of this unique known population of *E. a. transcaucasica* could be assured. The translocation in a proper site of some individuals of this population could assure its continuity.

Table 1. Density estimations for populations *E.arguta*.

Period of time	Total lizards	Individuals/ha
<b>September 12-18, 2011</b>	46	42
September 12-15, 2008	85	70
<b>June 1-5, 2012</b>	14	11
June 5-8, 2009	21	36

## **Microhabitat preference.**

*E. a. transcaucasica* is a sit and wait species rarely seen on open surface. Thus for this species is most important the occurrence on territories various type of shelters as bushes, medium and large rocks, litter etc. Next important characteristic of the habitat of this lizard is the soil type which is crucial seeing their burrowing behavior. Thus in survey area we divided territories on optimal and poor conditions for lizards according to their presence or absents.

Optimal conditions: slope, availability of medium and large rocks, burrows, soft and fragile soil and low shrubby vegetation. Primary floral species are astragals *Astragalus maximus*, *Astragalus sevangesis*, thistles *Cirsium vulgare*, *Carduus nutans*, henbanes *Hyoscyamus niger* and different grass plant association. Clay sandy loam soil where sandy fractions <2mm.

Poor conditions: top or bottom of slope, hard lumps soil unsuitable for burrowing, absence of burrows, shrubby vegetations, shelters. Stony-clayey type soil where sandy fractions >2mm. High percentage of wormwood species *Artemisia fragrans*.



A



B

*Fig. 2. Microhabitat preference of E. arguta transcaucasica:  
A – optimal conditions, B – poor conditions*

### **Surveys of the adjoining territories for translocation**

In order to achieve the main aim we planned to find the sites which are most suitable according to the microhabitat preference of the species were also possible organize a protection of habitat. 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 explored area is not appropriate. Only one patch in the Sevan Lake Protected Area has been identified. It is located just near to the extant population where it is also possible to apply proper conservation measures. All other sites were or destroyed, or very small in surface, or anthropized. Moreover we have found that territory of maternal population was expanded and probably this species may occupy newly found area without external help. Thus in comparing with data of surveys of 2008-2009 with data of 2011-2012 has shown that their area of population is increased from 0.25 km<sup>2</sup> till 0.42 km<sup>2</sup>. During two years they are shifted the boundaries

of their area towards of west side of slope on 600 meters. However, because of declining of population size a plan of translocation of young lizards from agriculture lands to places where they have chance for sufficient hibernation is important.



*Fig.3. Territory of habitat of E. arguta: red line – area of 2009, blue line - seized territory at 2012.*



*Fig. 4. Field works. Searching the lizards*

## **Translocation plan for establishment of a self-sustaining population of *E. arguta***

Translocation plan will consist of several activities.

1. We explore the idea to establish a Special Protected Area of *Eremias arguta transcaucasica* on outlined quarter 0.17 km<sup>2</sup> from whole area of distribution *E. arguta* on Sevan Lake shore, which is part of Sevan Lake Park. No fence is need here.

2. Improve the microhabitat by inserting on territories some additional shelters like flat medium size rocks, and prepare hole by 10-15 cm in deep. Remove from territories the litters which attract the predators like dogs, cats, gulls, crows etc.

3. Translocate the young lizards from agricultural field on bottoms and top of slope to new site. The distance of translocation is near one kilometer and lizards can be quickly moved by car from one site to other. Thus the lizards may be collected in separate cotton sacks and released during one hour. It is important that translocation will be in September where juveniles appear. We will not catch the adult lizards. We will release lizards into the specified area. This may include specially designed habitats or artificial burrows. The 20-30 young during 2-3 years from adjacent agricultural field will translocate.

4. Submit to Ministry of Natural Protection and to administration Sevan Lake Park as well to administration of village the plan of translocation of lizards. Due to some part of current distribution area of *E. arguta* are entering into the territories of Sevan Park it is possible to attract the attention of officers of administration to protection some special territories.

5. Intensive monitoring of released lizards in an experimental framework.

6. Enhanced understanding of factors influencing the success of translocation.
7. Because of the endangered lizards can be bred in the laboratory and has a relatively short generation length; we also may start the program of reintroduction in case if translocation will not establish a self-sustaining population of *E. arguta*.
8. We will also try to securing the support of local stakeholders. The creation of group volunteers of schoolchildren from local village and involving them in conservation measures will be long-term program of co-operation to conservation this unique population.

Translocation is an effective tool, but it can also be a risky process. The post-translocation monitoring will help assess the success of establishment of sustaining high density of lizards. The using only juveniles from unsuitable places will allow escape from negative influence on main population.



*Fig. 5. The site estimated for establishment of special protected area.*

# Environmental Educational Program

## Seminars

The seminars at the schools were organized in 2011-2012 and they included information sessions for children from Noratuz village.

The meetings organized in period November, 2011 and May, 2012 in the two schools in village, where were presented the following subjects:

- Biodiversity – informations about biodiversity of Sevan Lake;
- Reptiles importance to humans and role in ecosystems.
- Importance of conservation of *Eremias arguta*
- Negative influence because of lizards extinction.

25-minutes class seminars were conducted in eight classes using the slide-show where possible. During the seminars interactive role-playing games were organized. To check effectiveness of the seminar questionnaires were filled out by the participants. On the basis of test results several participants received presents (environmental books and films). The test revealed that the seminars were very effective. More than 80% of seminar participants learned the presented information. Near 150 pupils were participated in the seminars. Wall calendars and booklets were distributed.

During May 2012, we made two scientific presentations that were organized by Young Biologists NGO meetings.





*Fig. 6. Presentation made at the seminar “Day of Biodiversity”*

### **Distribution of booklets and wall calendars**

The booklets which are referring to the actual state of lizards and common information about this species, as well as calendars entitled “I am on the edge of extinction” A3 size with image of target species were prepared and printed.

We distributed booklets to schoolchildren and local people of the surrounding villages in order to increase local knowledge and achieve positive attitude concerning environment and wildlife.

Also some calendars and booklets were distributed among zoologists at the International Conference “Biodiversity and conservation problems of fauna in Caucasus” Yerevan, Armenia 26-29 September, 2011 and to herpetologists at SEH European Congress of Herpetology and DGHT Deutscher Herpetologentag, Luxembourg and Trier, 25-29 September, 2011.

The electronic version of the booklet will be available at the YBA website ([www.yba.am](http://www.yba.am)).



*Fig. 7. Distribution the wall calendars and booklet among rural population of target village*



*Fig. 8. Distribution the wall calendars and booklet in schools of target village*

## Capacity building program

In the framework of this project we have organized field practice stages for students of the Faculty Biology and members of the Young Biologists Association who worked with us. Together with the herpetologist the YBA Biodiversity Conservation and Research group on mammals and birds took place on these territories, rich in biodiversity however poor investigated. We have hired one Bachelor student who will prepare her thesis on the topic conservation of *Eremias arguta transcaucasica*.



*Fig. 9. Field practice for students of Yerevan State University in vicinity of area of  
E. arguta*

## Literature

Chernov S. A. 1934. [On the subspecies and distribution of the steppe racerunner].

// AN SSSR. Ser. Biol., 1934. Vol. 3, № 8-9. - pp. 666-668 (in Russian).

Darevsky I. S. 1953. [On the taxonomic position of the Transcaucasian steppe racerunners *Eremias arguta* (Pall.) (Reptilia, Sauria)]. // Dokl. AN ArmSSR. 1953; 16, № 4; p. 117-121.

Darevsky I. S. 1957. [The Turanian elements in the herpetofauna of Transcaucasia and the possible ways of their penetration from Middle Asia]. // Izvestiya AN ArmSSR (The news of Armenian SSR Academy of Sciences), X, № 12, pp.69-77 (in Russian).

Darevsky I. S. 1959. [Zoogeographical peculiarities of the herpetofauna of the Sevan Lake basin and their probable reasons]. // Izvestiya AN ArmSSR (The news of Armenian SSR Academy of Sciences), XII, № 10, pp.15-22 (in Russian).

Orlova V. F. 2008. Taxonomical diversity of the *Eremias* lizards: history and recent state of the problem. In: Ananjeva, N.B., Danilov, I.G., Dunayev, E.A. (Eds.), The Problems of Herpetology, Proceedings of the 3th Meeting of the Nikolsky Herpetological Society, St. Petersburg, pp. 328–336.

Orlova, V. F., N. A. Poyarkov, M. A. Chirikova, S. I. Dolotovskaya 2007. Preliminary molecular phylogeography of wide-spread steppe-runner lizard – *Eremias arguta* (Lacertidae) and considerations on its subspecific structure. // Abstracts of the 14th OGM SEH; (2007), p. 263.

Sczcerbak N. N. 1970. [Is there the steppe racerunner, *Eremias arguta* (Pall.) in Turkey?] // Vestn. Zoologii. 1970; № 5; p. 31 (in Russian).

Sczcerbak N. N. 1974. [Racerunners of the Palaearctic]. Yaschurki Palearktiki. – Kiev, 1974. – 293 p., (in Russian).