

To the Found of New North Ossetia's Population of Greek Clouded Yellow (*Colias aurorina* Herrich-Schäffer, 1850)

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Abstract: Greek Clouded Yellow is a rare and endangered species of butterflies, previously listed and now proposed for listing in the Red Book of the Republic of North Ossetia-Alania. The species is also listed in IUCN Red List and Red Books of the Russian Federation, Azerbaijan, Armenia, Dagestan, Chechnya, Ingushetia, Kabardino-Balkaria. Earlier in the republic there were two populations of Greek Clouded Yellow reliably established. During field research in May-July 2021 in the vicinity of the village of Ksurta on the territory of the Sadono-Unalskaya semiarid intermountain depression, a previously unknown habitat of Greek Clouded Yellow was found. It is used the reference practical standard of entomological material's collecting and registration, of visual observations and images taken with digital cameras. Geographical coordinates and absolute heights were measured by means of the GPS navigator. Determination of butterflies was carried out on external diagnostic signs. The method of relative accounting of butterflies based on records on the route per unit of time was applied. In the period 30.05-03.07.2021, occurrence indicates the multiplicity of the specimens in this habitat. The identified habitat is 2.3 km northwest of the previously known Unal habitat. These lands are used by the local population as pastures for cattle and horses and the slopes were intensively trampled and covered with a dense network of paths. The discovered population gives hope for the preservation of this species in the Republic of North Ossetia-Alania.

Keywords: Greek Clouded Yellow, *Colias aurorina*, Habitats, Republic of North Ossetia-Alania, Alagir District, The Village of Ksurta

1. Introduction

The Greek Clouded Yellow found in the Central Caucasus very locally. This species was previously listed in the Red Book of the Republic of North Ossetia-Alania (1999) (RNO-A), as a rare, reducing species that lives on the periphery of the range [1]. Currently, a list of rare and endangered insects of the republic of RNO-A has been prepared and the next edition of the Red Book is being prepared, which will also include this butterfly.

The purpose of this study is to investigate the features of North Ossetia populations of Greek Clouded Yellow.

Due to intensive country construction, the Unalskoye butterfly habitat [2] is subjected to an intense anthropogenic load and is on the verge of extinction. The find of any previously unknown butterfly habitat of this species can be

considered a great success making preservation of the species on the territory of the republic more likely.

2. Material and Methods

During the study it is used the reference practical standard of entomological material's collecting (catching by air entomological net) and registration (writing of field labels), of visual observations (route inspections, expeditions, maintaining the field diary) and images taken with "Sony Cyber-shot DSC-H300" and Honor 7A cameras. Photography is carried out as in field, and laboratory conditions. Geographical coordinates and absolute heights were measured by means of the Garmin etrex 20x GPS navigator (frame WGS-84).

Determination of butterflies was carried out on external

diagnostic signs. The method of relative accounting of butterflies based on records on the route per unit of time was applied [3, 4].

The collected specimens and the finished shooting photos are stored in personal archive of V. Dobronosov (in Vladikavkaz).

The researches were conducted 30.05.2021, 17.06.2021,

24.06.2021, 03.07.2021 in the midmountain forest belt of the RNO-A, in Sadono-Unalskaya depression during route inspections.

The type of vegetation is mountain-xerophytic consisting of dilute thickets of prickly bushes and herbs with tragacanth [2].

The study area is shown on the schematic map (Figure 1).

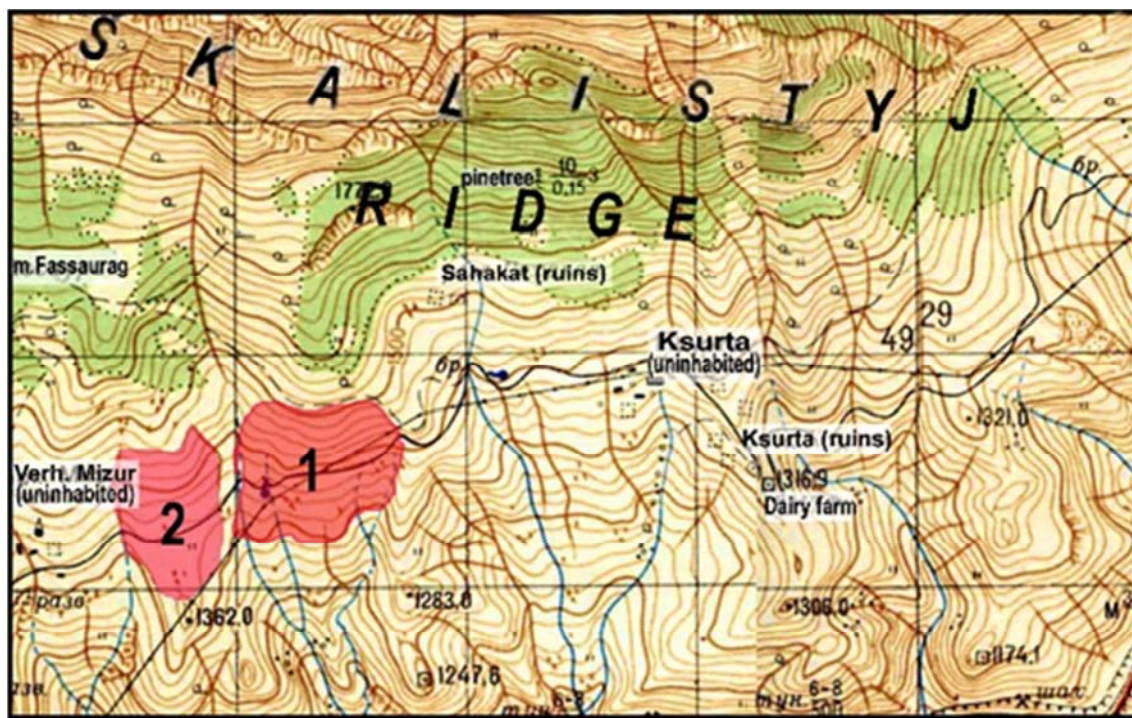


Figure 1. The study area.

3. Results and Discussion

During our field research in May-July 2021 in the vicinity of the village of Ksurta, Alagir district of the Republic of North Ossetia-Alania, located on the territory of the Sadono-Unalskaya semiarid intermountain depression (Northern Jurassic Depression), a previously unknown butterfly habitat was found. It is single, although it consists of two clusters. We have set the following parameters for it - total area about 0.2 sq.km: cluster 1 - area is about 0.1 sq.km, cluster 2 - area is about 0.1 sq.km.

Extreme points of cluster 1 are: northern point - 42°52'19.01" N, 44°07'43.60" E, 1,330 m above sea level; south point - 42°52'9.72" N, 44°07'42.06" E, 1,223 m above sea level; east point - 42°52'17.4" N, 44°07'50.1" E, 1,276 m above sea level; west point - 42°52'14.10" N, 44°07'37.00" E, 1,280 m above sea level.

Extreme points of cluster 2 are: northern point - 42°52'18.62" N, 44°07'26.13" E, 1,380 m above sea level; south point - 42°52'07.36" N, 44°07'29.85" E, 1,240 m above sea level; east point - 42°52'14.81" N, 44°07'34.75" E, 1,292 m above sea level; west point - 42°52'12.43" N, 44°07'22.77" E, 1,290 m above sea level.

In the identified habitat, as in others, Greek Clouded Yellow

inhabits mountain slopes covered with tragacanth astragalus (*Astracantha*). These lands are used by the local population as pastures for cattle and horses. In this regard, the slopes were intensively trampled and covered with a dense network of paths (Figures 2 1-3). Such xerophytic plant communities develop mainly on slopes of the southern and southeast exposure on Skalistyj (Rocky) Ridge. According to literature, butterflies are found in North Ossetia at absolute altitudes of 1,000-1,100 m above sea level [2]. Our studies have shown that the highest height at which butterflies are found is 1,380 m. In other parts of the Caucasus they were met to a height of 1,500 m [5].

In the period 30.05-03.07.2021, an average of 10 butterfly specimens was observed in both clusters of habitats in one hour. According to the method of relative accounting of butterflies based on records on the route per unit of time, this occurrence indicates the multiplicity of the specimens in this habitat [3, 4].

The identified habitat is 2.3 km northwest of the previously known Unal habitat. It is likely that these are parts of the once unified habitat that took place in the Sadono-Unalskaya intermountain depression earlier.

This depression occupies the valley of the Ardon River, between the Skalistyj and Bokovoj Ridges. It is separated from neighboring depressions by the Kora and Zgidskij

passes. The depression is cluttered by a powerful thickness of loose-debris geological material of various origins. Landslides, showers, drift cones, moraine and river deposits are common in this area [6, 7].



Figure 2. 1 - slope covered with *tragacanth astragalus*; 2 - *tragacanth astragalus* (*Astracantha*); 3 - network of paths.

In the direction from north to south it crosses the Trans-Caucasian highway with a high traffic intensity [8]. Until recently, in the floodplain of the Ardon River in the vicinity of the village of Unal, there was a tailings dump of the Mizur mining and processing plant, which had a strong negative impact on the environment [9].

To confirm the correctness of visual identification, 2 butterfly specimens were caught: 1 male and 1 female (Figure 3 a, b).



Figure 3. *Colias aurorina* H-S. a – male, b – female.

The wingspan of both specimens is about 6 cm. The color of the male is classic; the female is represented by a whitish form - f. alba Rühl [10-12].

4. Conclusions

The issue of biodiversity conservation is one of the main environmental problems in the world. The protection of rare and endangered butterfly's species populations is no exception in this process.

The previously known population in the vicinity of the village of Unal [13] now is almost on the verge of extinction, due to the destruction of tragacantaries for construction sites.

The discovered population is most likely part of the once vast population that inhabited all the tragacantes of the

Sadono-Unalskaya depression.

In view of the fact that this species of butterfly is listed in IUCN Red List and Red Books of the Russian Federation, Azerbaijan, Armenia, Dagestan, Chechnya, Ingushetia, Kabardino-Balkaria the North Ossetia Republican Red Book, the find of a previously unknown population with such good butterfly density gives hope for the preservation of the species within North Ossetia. This is also important on a Pan-European and global scale.

To preserve the identified population, it is very important to regulate the number of livestock and the grazing regime of cattle and horses on the slopes in order to prevent tragacantes from being reduced as a result of paths erosion [14, 15].

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