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SPECIES DIVERSITY AND POPULATION STRUCTURE OF HARVESTMEN (Arachnida, Opiliones) COMMUNITIES IN THE CAUCASIAN STATE NATURE BIOSPHERE RESERVE (Russia)

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Abstract. We present the first study of harvestmen populations in the Caucasus State Nature Biosphere Reserve. As a result of this study, 17 species from three families - Trogulidae Sundevall, 1833 (2 species), Nemastomatidae Simon, 1872 (7 species), Phalangiidae Latreille, 1802 (8 species) and 14 genera were recorded, with a total of 14,361 individuals collected. Among them, *Odiellus zecariensis* was the dominant species, accounting for 67.21% of the total sample. To analyze the ecological structure of harvestmen communities, ecological indices were calculated, species abundance curves were constructed and cluster analysis based on faunistic similarity was performed. Faunistic and ecological data are provided for each recorded species.

Keywords: *New data, harvestmen, population, Caucasus Reserve, North-Western Caucasus.*

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1. Introduction

The harvestmen (Opiliones) fauna of the Caucasus Biosphere Reserve remains insufficiently studied. Based on published data, approximately 29 species have been recorded within the reserve, including those found in the Yew-Boxwood Grove. Existing information is limited and primarily derived from the works of Staręga (1966), Martens (2006) and a few others. Only a few studies have specifically focused on the harvestmen fauna of the reserve. Notably, Snegovaya and Chumachenko (2014) analyzed the population structure of 13 harvestmen species, while subsequent studies focused on the ground-dwelling harvestmen communities of the Yew-Boxwood Grove, an isolated sector of the reserve (Snegovaya & Chumachenko, 2011, 2013, 2018).

The aim of this study was to provide the first large-scale assessment of harvestmen diversity and community structure in the Caucasian State Nature Biosphere Reserve.

2. Material and Methods

Fieldwork was carried out by the second author in the Caucasus State Nature Biosphere Reserve (CSNBR) during two sampling periods, in 2009 and 2018. The study area extended from the Guzeripl cordon to the alpine belt in the vicinity of Tybga, encompassing the northern forestry sector of the reserve situated in the Maykop District of the Republic of Adygea.

Harvestmen were sampled using Barber-type pitfall traps installed at permanent monitoring plots. At each site, ten traps were deployed. The traps consisted of disposable plastic cups (volume: 500 ml) partially filled with a 4% formaldehyde solution used as a preservative and fixative. The traps were embedded flush with the soil surface to ensure effective capture of ground-dwelling arthropods and were checked at monthly intervals. Over the course of the study, a total sampling effort exceeding 10,000 trap-days was accumulated.

In this study, we follow the system proposed by Kury et al. (2023). According to this system, the order of harvestmen is divided into 4 suborders: Cyphophthalmi Simon 1879, Eupnoi Hansen & Sørensen 1904, Dyspnoi Hansen & Sørensen 1904, Laniatores Thorell, 1876. The specimens were identified using the following main sources Martens (1978, 2006), Snegovaya and Chumachenko (2011). In addition, comparative material from the collection of the Institute of Zoology of the National Academy of Sciences of Azerbaijan and the personal collection of N.Yu. Snegovaya was used. A concise characterization of the plant communities at the sampling sites is provided below to contextualize the ecological conditions under which the specimens were collected.

Site 1: Mixed Broadleaf Forest

Republic of Adygea, Maykop District, right bank of the Belaya River, in the vicinity of the Guzeripl cordon; elevation 695 m a.s.l.; coordinates: 43°59'23.02"N/ 40°07'36.56"E. The site is located within the belt of humid broadleaf forest, characterized by the predominance of *Fagus orientalis* in the upper canopy. Other arboreal species present include *Abies nordmanniana*, *Quercus robur*, *Alnus* spp., *Ulmus* spp. and *Fraxinus* spp. The shrub layer is composed primarily of *Sambucus nigra* and *Rhododendron ponticum*. The herbaceous layer includes *Dryopteris filix-mas, Athyrium filix-femina*, *Impatiens* spp., *Lamium* spp., *Oxalis acetosella, Carex* spp., *Paris quadrifolia, Asarum* spp., among others. Specimens were collected from May to September 2018.

Site 2: Medium-Grass Fir–Beech Forest with Fescue

Republic of Adygea, Maykop District, right bank of the Molchepa River, near the Guzeripl cordon; elevation 720 m a.s.l.; coordinates: 43°59'41.32"N/40°08'27.81"E. The site is located within a relatively light and dry forest belt, with the upper canopy dominated by *Fagus orientalis*, accompanied by *Abies nordmanniana*, *Carpinus* spp., *Fraxinus excelsior, Acer campestre, Acer platanoides* and *Tilia* spp. The shrub layer includes *Corylus avellana*, *Euonymus europaeus*, *Crataegus pentagyna* and *Rosa* spp. The herbaceous layer is characterized by *Festuca* spp., *Phleum pratense*, *Viola* spp. and *Dactylis glomerata*, with an overall projective cover of approximately 15%. Specimens were collected from May to September 2018.

Site 3: Medium-Grass Fescue Beech-Fir Forest

Republic of Adygea, Maykop District, located at the 3rd kilometer of the road from the Guzeripl cordon to the Abago Pasture Ridge; elevation 890 m a.s.l.; coordinates: 43°59'06.32"N/40°09'12.68"E. The site lies within the forest belt and the plant

community largely corresponds to that described at Site 2. The upper canopy is dominated by *Abies nordmanniana* and *Fagus orientalis*, with the presence of *Acer platanoides*, *Fraxinus excelsior* and *Tilia* spp. also noted. Specimens were collected from May to September 2009.

Site 4: Beech-Fir Forest with Ferns

Republic of Adygea, Maykop District, located at 3.5 km along the road from the Guzeripl cordon to the Abago Pasture Ridge; elevation 910 m a.s.l.; coordinates: 43°59'06.32"N/40°09'12.68"E. This site lies within a darker and more humid forest belt, with a canopy dominated by *Fagus orientalis* and *Abies nordmanniana*. The shrub layer includes *Rhododendron ponticum*, *Vaccinium arctostaphylos*, *Ilex* spp., *Euonymus europaeus, E. latifolius* and *Rubus caucasicus*. The herbaceous layer is composed of *Orchis* spp., *Dryopteris filix-mas, Polypodium vulgare, Galium odoratum, Chelidonium majus, Rudbeckia* spp., *Geranium sylvaticum, Symphytum officinale, Alnus glutinosa* and *Oxalis acetosella*, among others. Specimens were collected from May to September 2009.

Site 5: Tall-Grass Maple Stand

Republic of Adygea, Maykop District, located at the 10th kilometer of the road from the Guzeripl cordon to the Abago Pasture Ridge; elevation 1650 m a.s.l.; coordinates: 43°57'12.08"N/40°12'33.78"E. The upper forest canopy is primarily composed of alpine maple (*Acer pseudoplatanus*). The shrub layer is sparse, with occasional individuals of *Ribes biebersteinii, Daphne* spp. and *Rubus idaeus*. The herbaceous layer is dense and tall (reaching 50-60 cm in height), characterized by the predominance of *Dryopteris filix-mas*, *Orchis* spp. and *Petasites albus*. The material was collected from June to September 2009.

Site 6: Subalpine meadow with mixed herbs and grasses.

Republic of Adygea, Maykop District, “Abago Pasture” ridge, 1780 m above sea level, 43º56'51.38"N/40º12'29.71"E.

The site is characterized by rich subalpine vegetation. Dominant herbaceous species include *Anemone fasciculata, Campanula* spp., *Inula orientalis*, *Centaurea* spp., *Polygala* spp. and *Ranunculus caucasicus*, along with a diverse assemblage of other herbs, legumes and wild grasses. *Veratrum lobelianum* is also present.

Material was collected from June to September 2009.

Site 7: Forb-grass subalpine meadow.

Republic of Adygea, Maykop District, lower slope of Tybga Mountain, 2050 m above sea level (43º53'41.7"N/40º16'22.4"E). The area is characterized by the typical distribution of mid-height forb-grass subalpine meadows. *Veratrum lobelianum* is present, along with a diverse herbaceous layer, including *Geranium sylvaticum, Calamagrostis arundinacea, Festuca woronowii, Bromus variegatus, Avenula adjarica, Festuca ovina, Anemone narcissiflora, Betonica grandiflora, Polygonum bistorta* and *Gentiana septemfida*, among others. Material was collected from July to September 2018.

Site 8: Low-grass alpine meadow.

Republic of Adygea, Maykop District, vicinity of Tybga Town, at an elevation of 2360 m above sea level (43º53'1.19"N/40º16'15.70"E). The site is characterized by alpine vegetation with low-growing plant species, dominated or co-dominated by *Carex yue, Rhododendron caucasicum, Vaccinium vitis-idaea, Anemone spp., Ranunculus spp., Campanula biebersteiniana, Carum caucasicum, Phleum alpinum, Polygonum bistorta* and *Sedum* spp., among others. Material was collected from July to September 2018.

Indices were calculated and graphs generated using PAST version 4.13 (Hammer *et al.*, 2001). The dominance structure was assessed according to the Engelmann scale

(1978). Species with a relative abundance of 1.3-3.9 % were classified as reference species; 4.0-12.4 % as subdominant; 12.5-39.9 % as dominant and 40.0-100 % as eudominant. All Opiliones specimens are deposited in the personal collection of N. Yu. Snegovaya (RCNS).

3. Results

As a result of field studies conducted within the territory of the Caucasian State Nature Biosphere Reserve (CSNBR) in 2009 and 2018, a total of 17 species of harvestmen (Opiliones) belonging to three families were collected using soil traps: Trogulidae (2 species), Nemastomatidae (7 species) and Phalangiidae (8 species). The species composition and their distribution across the surveyed sections of the reserve are presented in Table 1 and Figure 1. The highest number of harvestmen was recorded in the tall-grass maple forest on the "Abago Pasture" ridge, with 5,489 individuals captured. This corresponded to 507.2 individuals per 100 trap-days. This was followed by the beech-fir forest with fern and bramble (ozhina) along the Guzeripl cordon - "Abago Pasture" ridge transect, where 2,117 individuals were recorded (135.5 individuals/100 trap-days); the forb-grass subalpine meadow near Tybga Mt. - 2,045 individuals (154.1 individuals/100 trap-days) and the medium-grass fescue beech-fir forest along the Guzeripl cordon - "Abago Pasture" ridge - 1,584 individuals (93.9 individuals/100 trap-days). Lower numbers were recorded in the broad-leaved forest near the Guzeripl cordon - 1,013 individuals (78.1 individuals/100 trap-days); the forb-grass subalpine meadow on the "Abago Pasture" ridge - 924 individuals (78.4 individuals/100 trap-days); the fir-beech forest with medium-grass fescue at Guzeripl cordon - 655 individuals (51.1 individuals/100 trap-days) and the lowest number of individuals was recorded in the low-grass alpine meadow near Tybga Mt. - 534 individuals (67.1 individuals/100 trap-days). Within the territory of the reserve, *Odiellus zecariensis* was the most abundant species among those captured, accounting for 9,652 individuals or 67.2% of the total catch. This was followed by *Phalangium opilio* (1,994 individuals), *Mitopus morio* (664), *Odiellus lendli* (588), *Rilaena zakatalica* (506) and *Paranemastoma kalishevskyi* (360). The remaining species were represented by only a small number of individuals. In terms of species richness, the fir-beech forest with medium grass and fescue at the Guzeripl cordon, as well as the beech-fir forest with similar vegetation along the Guzeripl cordon-Abago Pasture Ridge transect, each hosted 11 species - the highest recorded in the study. These were followed by the broad-leaved forest in the vicinity of the Guzeripl cordon and the beech-fir forest with fern-grass cover along the same transect, each with 10 species. The forb-grass subalpine meadow on Tybga Mountain harbored 8 species. Seven species were recorded in each of the following habitats: the tall-grass maple forest on the Abago Pasture Ridge, the forb-grass subalpine meadow on the Abago Pasture Ridge and the low-grass alpine meadow on Tybga Mountain.

At Site 1, the highest catchability was recorded in May, reaching 166.6 specimens per 100 trap-days, while the lowest was observed in September (13.13 specimens/100 trap-days). At Site 2, peak catchability also occurred in May (111.42 specimens/100 trap-days), with the lowest value in September (10.4 specimens/100 trap-days). At Site 3, maximum catchability was recorded in June (322.18 specimens/100 trap-days) and the minimum in September (9.40 specimens/100 trap-days). Site 4 showed the highest catchability in July (282.69 specimens/100 trap-days) and the lowest in September (49.81 specimens/100 trap-days).

At Site 5, the highest catchability was observed in July, with a notable value of 886.46 specimens per 100 trap-days, while the lowest was in August (207.69 specimens/100 trap-days). At Site 6, catchability peaked in September (118.06 specimens/100 trap-days) and was lowest in June (41.43 specimens/100 trap-days). Site 7 also recorded its maximum catchability in September (257.43 specimens/100 trap-days) and its minimum in July (122.62 specimens/100 trap-days). Finally, at Site 8, the maximum catchability was recorded in September (155.43 specimens/100 trap-days), with the minimum in July (22.41 specimens/100 trap-days). Among all surveyed sites, Site 5 exhibited the highest average catchability, with a maximum value of 126.8 specimens per 100 trap-days. Conversely, the lowest average catchability was recorded at Site 2, with a value of 7.19 specimens per 100 trap-days.

As a result of the ecological analysis of hayfield community structures across various sites within the Caucasian State Nature Biosphere Reserve (CSNBR), a set of commonly applied ecological indices was calculated and is presented in Table 1.

As shown in Table 1, the highest value of the Shannon diversity index was recorded at Site 8, representing the low-grass alpine meadow near Tybga Mt., with a value of 1.2. In contrast, the lowest Shannon index value (0.4) was observed at Site 5, located in the tall-grass maple forest on the "Abago Pasture" ridge.

The highest value of the Simpson dominance index was also recorded at Site 5 (82%), while the lowest was at Site 6, representing the forb-grass subalpine meadow on the "Abago Pasture" ridge (41.2%). These Simpson index values accurately reflect the observed species distributions. A higher dominance index indicates a stronger prevalence of one or two species. This is particularly evident at Site 5, where *Odiellus zecariensis* was overwhelmingly dominant, with 4,958 individuals collected, highlighting the species' ecological dominance in this habitat.

The Pielou evenness index ranged from a minimum value of 22.1 at the site with tall-grass maple forest on the "Abago Pasture" ridge to a maximum value of 57.2 at the site representing the low-grass alpine meadow near Tybga. As the Pielou index reflects the evenness of species abundance distribution, the low value observed at the tall-grass maple site (22.1) can be attributed to the pronounced dominance of *Odiellus zecariensis* in that area.

The similarity in species composition of harvestmen across the studied areas of the Caucasian State Nature Biosphere Reserve was assessed using cluster analysis based on faunistic similarity. The results are presented in the dendrogram shown in Figure 2. The highest degree of similarity (74%) was observed between Site 1 (broad-leaved forest) and Site 2 (fir-beech forest with medium grass and fescue), as well as between Site 3 (beech-fir forest with medium grass and fescue) and Site 4 (beech-fir forest with elm and fern). The lowest similarity (43%) was recorded between Site 6 (forb-grass subalpine meadow) and Site 8 (low-grass alpine meadow).

Odiellus zecariensis is identified as a eudominant species in Sites 1-6, while its status shifts to recedent in Sites 7 and 8. *Phalangium opilio* is also considered a eudominant species in Sites 6-8. *Mitopus morio* is the dominant species in Site 8. All other recorded species are significantly lower in abundance and are classified as either recedent or subdominant (Table 1).

Among the harvestmen species studied, *Calathocratus caucasicus* was observed exclusively within the forest belt dominated by oriental beech and Caucasian fir. This species did not exhibit pronounced seasonal peaks in activity. The highest dynamic density was recorded in the beech-fir forest with medium grass and fescue, reaching 7.53

specimens per 100 trap-days over the season (Figure 3, Table 2). *Trogulus rossicus* was observed only as isolated individuals within the fir-beech and beech-fir forests with medium grass and fescue, with a seasonal average of 0.05 specimens per 100 trap-days. *Giljarovia tenebricosa* was recorded in the reserve only in the vicinity of the Guzeripl cordon and within beech-fir forests up to elevations of 1500 m a.s.l. In both the broad-leaved forest and the fir-beech forest with medium grass and fescue, the peak activity of this species occurred in late spring to early summer, reaching 4.35 and 3.04 specimens per 100 trap-days, respectively. In the beech-fir forest with medium grass and fescue, the species was present throughout nearly the entire study period, with the exception of the hottest month, July. In contrast, within the beech-fir forest with elm and fern, it was recorded only during May and June, reaching its peak dynamic density in early June (2.94 specimens per 100 trap-days) (Figure 4, Table 2). *Giljarovia trianguloides* was collected in both the tall-grass maple forest and the subalpine belt throughout the entire study period. In the subalpine belt, its occurrence was very low, ranging from 0.13 to 0.36 specimens per 100 trap-days per season. In contrast, its presence in the maple forest was relatively high, with a seasonal average of 4.05 specimens per 100 trap-days, reaching a maximum in August (10.10 specimens/100 trap-days) (Figure 5, Table 2). Within the studied area of the reserve, *Caucnemastoma golovatchi* was recorded only sporadically in the forest belt, with a slightly higher dynamic density in the beech-fir forest with fern undergrowth (0.36 specimens per 100 trap-days per season). During the study, *Vestiferum funebre* was encountered in areas dominated by beech and fir. The maximum dynamic density was recorded in the beech-fir forest with elm and fern, reaching 0.52 specimens per 100 trap-days per season. Two activity peaks were observed: one at the end of May (1.76 specimens/100 trap-days) and another at the beginning of October (4.00 specimens/100 trap-days). *Mitostoma gracile* was recorded in all surveyed areas of the CSNBR except for the tall-grass maple forest. The highest seasonal occurrence was observed in the beech-fir forest with elm and fern, with a dynamic density of 2.61 specimens per 100 trap-days. The peak activity occurred at the end of June, reaching 12.00 specimens per 100 trap-days (Figure 6, Table 2). *Paranemastoma kalischevskyi* was present in all studied habitats except the alpine belt. Its highest dynamic density was recorded in the beech-fir forest with fern undergrowth, reaching 13.41 specimens per 100 trap-days per season (Figure 7, Table 2). *Nemastoma bidentatum* was captured in the vicinity of the Guzeripl cordon and in the forb-grass subalpine meadow at 2050 m a.s.l. near Tybga. In the subalpine meadow, it was found only as single individuals, recorded in September. In the broad-leaved forest, the primary peak in *Odiellus zecariensis* occurrence was observed in early May (4.55 specimens per 100 trap-days), while only single individuals were recorded during the autumn months. *Odiellus zecariensis* is the most abundant species across the studied areas of the Caucasian State Nature Biosphere Reserve. The highest seasonal occurrence was noted in the tall-grass maple forest (457.39 specimens/100 trap-days). This species reached peak dynamic density in all areas during July, with a secondary, less pronounced peak observed at the end of September (Figure 8, Table 2). *Odiellus lendli* was recorded exclusively in the subalpine and alpine belts near the Tybga Mt. Its highest dynamic density was observed in the forb-grass subalpine meadow (43.37 specimens/100 trap-days per season), with relatively uniform occurrence throughout the study period (Figure 9, Table 2). *Mitopus morio* was found in all surveyed areas except the broad-leaved forest and the forb-grass subalpine meadow at 1780 m a.s.l. The highest seasonal dynamic density was recorded in the tall-grass maple forest (27.56 specimens/100 trap-days). The primary activity peak for this species occurred in July

across all areas where it was present (Figure 10, Table 2). *Rilaena caucasica* was observed only in the short-grass alpine meadow, with a seasonal dynamic density of 3.92 specimens per 100 trap-days. The species was recorded from mid-summer until the end of the sampling period in late September, showing a relatively consistent level of activity across months (Figure 11, Table 2). *Rilaena zakatalica* was recorded in all study areas except the alpine belt. The highest seasonal dynamic density (12.46 specimens/100 trap-days) was found in the beech-fir forest with fern undergrowth. The peak activity of the species was generally observed in July. However, in the tall-grass maple forest, an inverse pattern was recorded: the lowest activity occurred in July (1.74 specimens per 100 trap-days), followed by a sharp increase in September, reaching 27.82 specimens per 100 trap-days (Figure 12, Table 2). *Metaplatybunus georgicus* was recorded across all study sites except the forb-grass subalpine meadow at 2050 m a.s.l., exhibiting varying patterns of occurrence. In three sites - the broad-leaved forest, fir-beech forest with medium grass and fescue and the low-grass alpine meadow - the species was collected only as isolated individuals in July. In the tall-grass maple forest, it was present throughout the sampling period, though at low densities, with a maximum catchability in September (1.61 specimens/100 trap-days). In contrast, in other areas, most specimens were collected in May and June, with the highest dynamic density recorded in the forb-grass subalpine meadow (15.71 specimens/100 trap-days) (Figure 13, Table 2). *Phalangium opilio* was recorded only in areas above the forest line. In these high-altitude sites, it exhibited relatively high dynamic densities, reaching up to 41.03 specimens per 100 trap-days per season in the alpine belt and ranging from 38.90 to 90.38 specimens per 100 trap-days in the subalpine belt. Peak activity occurred in August and September (Figure 14, Table 2). An unidentified *Opilio* species (*Opilio* sp.) was recorded as a single individual in the broad-leaved forest during the study.

4. Discussion

This study represents the first large-scale survey of harvestmen communities in the Caucasian State Nature Biosphere Reserve (CSNBR), revealing 17 species from three families and providing new insights into their ecological differentiation across habitats.

Current results of our work showed that, community structure was strongly influenced by *Odiellus zecariensis*, which accounted for more than two thirds of all individuals collected. As predicted, this overwhelming dominance led to reduced evenness and diversity in forest habitats, particularly in the tall-grass maple stand, where the Shannon index reached its lowest value. In contrast, alpine and subalpine meadows demonstrated more balanced assemblages, with *Phalangium opilio* and *Mitopus morio* becoming abundant, resulting in higher evenness and Shannon diversity. Species richness peaked in forest habitats, where up to 11 species were recorded, while diversity indices (Shannon and Pielou) reached their maximum in alpine meadows. Cluster analysis clearly separated forest and meadow communities, with broadleaf and fir-beech forests forming one group and alpine meadows forming another. Subalpine meadows occupied an intermediate position.

From a biogeographic perspective, the CSNBR is part of the Caucasus biodiversity hotspot (Myers *et al*., 2000) and harbors many narrowly distributed taxa such as *Rilaena zakatalica, Caucnemastoma golovatchi* and others.

Ecologically, the abundance of dominant harvestmen species may have important consequences for nutrient cycling in forest ecosystems. As predators and detritivores,

harvestmen likely play a key role in regulating soil arthropod communities (Curtis & Machado, 2007; Acosta & Machado, 2007). Seasonal dynamics further confirmed distinct phenological strategies: many forest species peaked in early summer (*Giljarovia tenebricosa*, *Paranemastoma kalischevskyi*), while alpine species reached maximum activity in late summer and autumn (*Phalangium opilio*, *Mitopus morio*).

Methodologically, we note that pitfall trapping mainly captures ground-active individuals and may underrepresent arboreal or cryptic taxa. Moreover, the temporal coverage (2009 and 2018) does not allow for continuous monitoring of long-term changes. Nevertheless, the dataset provides an essential baseline for future biodiversity assessments.

In perspective, long-term monitoring along altitudinal transects would be valuable for tracking shifts in species distributions under climate change. Incorporating harvestmen into integrated biodiversity monitoring of the Caucasus will significantly enhance understanding of ecosystem functioning and conservation priorities in this global hotspot.

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Table 1. Distribution of harvestmen across plant communities in the Caucasian State Nature Biosphere Reserve

Taxons	Plant communities							
	Site 1: broadleaf forest	***Site 2: fir-beech forest, medium grass-fescue***	***Site 3: beech-fir forest, medium grass-fescue***	***Site 4: beech-fir forest with ferns***	***Site 5: tall-grass maple***	Site 6: subalpine meadow with mixed grasses	Site 7: subalpine grass-forb meadow	Site 8: low grass alpine meadow
Family Trogulidae Sundevall, 1833								
Calathocratus caucasicus (Šilhavý, 1966)	18 (1.8%) (10♂7♀1juv.)	31 (4.7%) (19♂12♀)	113 (7.1%) (43♂56♀14juv.)	84 (3.9%) (46♂22♀14juv.)				
Trogulus rossicus Šilhavý, 1968		1♀ (0.2%)	1♂ (0.06%)					
Family Nemastomatidae Simon, 1872								
Giljarovia tenebricosa (Redikorzev, 1936)	15 (1.5%) (9♂5♀1juv.)	16 (2.4%) (2♂14♀)	11 (1.7%) (5♂ 5♀ 1juv.)	10 (0.5%) (6♂ 4♀)				
Giljarovia trianguloides Martens, 2006					37 (0.7%) (10♂ 27♀)	4♂ (0.4%)	1♂ (0.05%)	
Caucnemastoma golovatchi Martens, 2006			1♂ (0.06%)	6 (0.3%) (5♀1juv.)	1♂ (0.02%)			
Vestiferum funebre (Redikorzev, 1936)	4 (0.4%) (2♂2♀)	1♂ (0.2%)	1♂ (0.06%)	9 (0.4%) (3♂4♀2juv.)				
Mitostoma gracile (Redikorzev, 1936)	28 (2.8%) (21♂7♀)	33 (5%) (23♂2♀8juv.)	9 (0.6%) (4♂5♀)	45 (2.1%) (21♂20♀4juv.)		1♀(0.1%)		1♂ (0.2%)
Paranemastoma kalischevskyi (Roewer, 1951)	65 (6.4%) (28♂36♀1juv.)	1juv. (0.2%)	11 (1.7%) (6♂5♀)	219 (10.3%) (99♂116♀4juv.)	61 (1.1%) (19♂41♀1juv.)	1♀ (0.1%)	2♀ (0.1%)	
Nemastoma bidentatum Roewer, 1914	8 (0.8%) (3♂5♀)	3♀ (0.5%)					1♀ (0.05%)	
Family Phalangiidae Latreille 1802								
Odiellus zecariensis Mkheidze, 1952	767 (75.7%) (1♂21♀745juv.)	558 (85.2%) (20♀538juv.)	1395 (88.1%) (1♂18♀1376juv.)	1528 (72.2%) (11♂158♀1359juv.)	4958 (90.3%) (65♂678♀4215juv.)	379 (41.0%) (31♂152♀196 juv.)	60 (2.9%) (13♂43♀4juv.)	7 (1.3%) (2♂3♀2 juv.)
Odiellus lendli (Soerensen, 1894)							560 (27.4) (55♂182♀323 juv.)	28juv. (5.2%)
Mitopus morio (Fabricius, 1779)		1♀ (0.2%)	20 (1.3%) (5♀15juv.)	16 (0.8%) (1♀15juv.)	310 (1.8%) (3♂7♀300juv.)		154 (7.5%) (8♂4♀142juv.)	163 (31.1%) (60♂103♀)
Rilaena caucasica Snegovaya, Tchemeris, 2016								30 (5.7%) (14♂15♀1juv.)
Rilaena zakatalica Snegovaya, Chemeris, 2004	106 (10.5%) (19♂31♀56juv.)	8 (1.2%) (2♀6juv.)	4 (0.3%) (1♂3juv.)	205 (9.7%) (10♂26♀169juv.)	114 (2.1%) (9♂14♀9 juv.)	42 (4.5%) (1♂1♀40juv.)	27juv. (1.3%)	
Metaplatybunus georgicus Mkheidze, 1952	1♀ (0.1%)	2♀ (0.3%)	18 (1.1%) (3♂15juv.)	10 (0.5%) (1♂9juv.)	8 (0.1%) (4♂3♀1juv.)	44juv. (4.8%)		4♀ (0.8%)
Phalangium opilio Linnaeus, 1758						453 (49.0%) (42♂206♀205 juv.)	1240 (60.6%) (107♂898♀235 juv.)	301 (57.4%) (29♂178♀94juv.)
Opilio sp.	1juv. (0.1%)							
Total number	1013	655	1584	2132	5489	924	2045	534

Average Seasonal Capture Rate (individuals/100 catch-days)	11.15	7.29	8.54	12.32	126.80	19.0	38.52	16.77
Shannon Diversity Index	0.9	0.7	0.5	1.0	0.4	1.0	1.0	1.1
Simpson Dominance Index, %	58.9	73.1	78.1	53.6	82.0	41.2	44.9	41.6
Pielou equivalence index, %	40.6	27.8	22.4	44.9	22.1	53.6	49.5	57.2

Note: Number of harvestmen per plot; % indicates species' relative abundance in each plot

Table 2. Seasonal Dynamics of Harvestmen Catches in Soil Traps (individuals/100 trap-days) in the Study Sites

Species	***May***	***June***	***July***	***August***	***September***
Site 1					
Calathocratus caucasicus	1.11	1.92	1.43	1.22	1.25
Giljarovia tenebricosa	3.54			0.38	
Vestiferum funebre	1.13				0.63
Mitostoma gracile	3.91	0.38	3.57	0.77	
Paranemastoma kalischevskyi	3.74		7.86	9.16	3.13
Nemastoma bidentatum	2.71				0.63
Odiellus zecariensis	127.67	75.77	27.86	15.82	5.63
Rilaena zakatalica	22.81	0.38	12.86	6.31	1.88
Metaplatybunus georgicus					0.71
Opilio sp.					0.71
Site 2					
Calathocratus caucasicus	3.77	1.92	2.14	1.22	1.92
Trogulus rossicus					0.38
Giljarovia tenebricosa	2.89	1.54		0.65	
Vestiferum funebre				0.19	
Mitostoma gracile	4.64	3.46	3.57	0.38	
Paranemastoma kalischevskyi				0.19	
Nemastoma bidentatum					1.15
Odiellus zecariensis	99.45	39.23	38.57	14.04	4.60
Mitopus morio				0.19	
Rilaena zakatalica	0.67				2.30
Metaplatybunus georgicus		0.38	0.71		
Site 3					
Calathocratus caucasicus	4.62	7.27	15.56	8.46	4.57
Trogulus rossicus	0.29				
Giljarovia tenebricosa	1.44	0.96		0.77	0.17
Vestiferum funebre					0.17
Mitostoma gracile		1.88	0.81	0.38	
Paranemastoma kalischevskyi	0.29	0.63	0.94	1.15	0.52
Caucnemastoma golovatchi	0.28				
Odiellus zecariensis	48.59	310.43	77.13	9.23	3.27
Mitopus morio		0.67	4.56	1.15	0.36
Rilaena zakatalica	0.29	0.33			0.34
Metaplatybunus georgicus	4.30		1.00	0.38	
Site 4					
Calathocratus caucasicus	7.79	6.12	6.50	2.69	2.91
Giljarovia tenebricosa	2.03	0.88			

Vestiferum funebre	0.88				1.00
Mitostoma gracile	1.70	9.53	2.38	0.77	
Paranemastoma kalischevskyi	20.23	20.41	20.13	8.46	3.88
Caucnemastoma golovatchi	0.57		0.31	0.38	0.71
Odiellus zecariensis	14.41	194.65	224.69	56.15	35.24
Mitopus morio		1.00	2.13	0.38	1.55
Rilaena zakatalica	9.67	16.88	26.25	9.62	4.52
Metaplatybunus georgicus	2.53		0.31		
Site 5					
Giljarovia trianguloides		1.43	1.04	10.10	3.63
Paranemastoma kalischevskyi		4.64	7.99	4.33	6.45
Caucnemastoma golovatchi					0.40
Odiellus zecariensis		523.21	816.32	183.17	306.85
Rilaena zakatalica		8.57	1.74	7.69	27.82
Metaplatybunus georgicus		0.36	0.69	0.48	1.61
Mitopus morio		43.57	58.68	1.92	6.05
Site 6					
Giljarovia trianguloides		0.36	0.31	0.77	
Paranemastoma kalischevskyi					0.32
Mitostoma gracile			0.31		
Odiellus zecariensis		24.29	31.56	16.92	53.55
Rilaena zakatalica		1.07	5.63	2.69	4.52
Phalangium opilio			30.94	65.00	59.68
Metaplatybunus georgicus		15.71			
Site 7					
Giljarovia trianguloides				0.22	
Paranemastoma kalischevskyi			0.48		
Nemastoma bidentatum					0.29
Odiellus zecariensis			2.38	3.23	10.0
Odiellus lendli			29.76	50.54	57.14
Mitopus morio			31.19	3.44	2.0
Rilaena zakatalica			1.67	2.58	2.29
Phalangium opilio			57.14	75.27	185.71
Site 8					
Mitostoma gracile				0.32	
Odiellus zecariensis			0.69		2.86
Odiellus lendli			2.07	3.23	6.86
Mitopus morio			3.45	9.35	70.86
Rilaena caucasica			1.38	5.48	5.14
Metaplatybunus georgicus			0.69	0.65	
Phalangium opilio			14.14	44.52	69.71

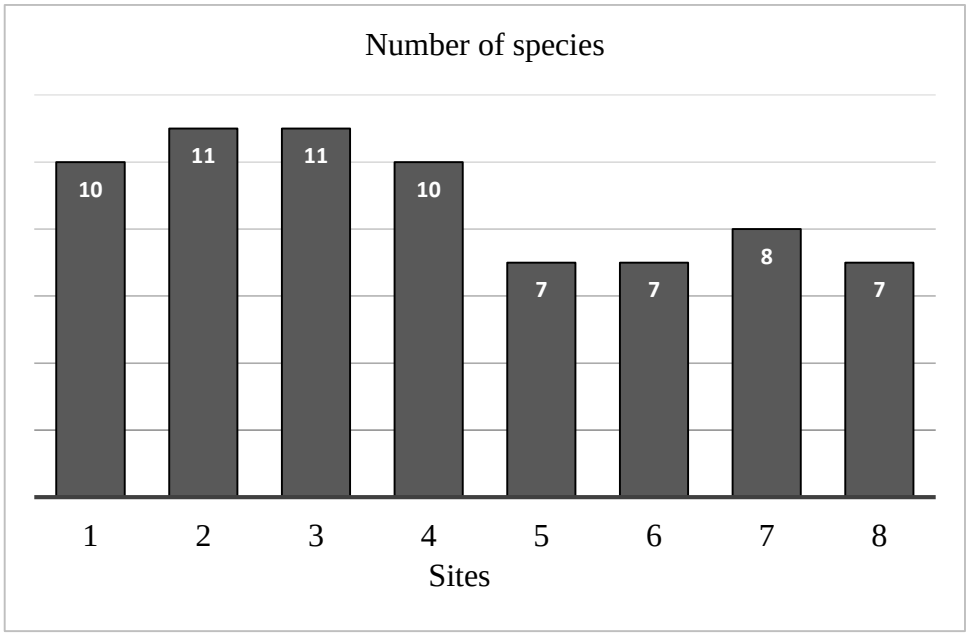

Figure 1. Species Richness of Harvestmen in Different Reserve Areas

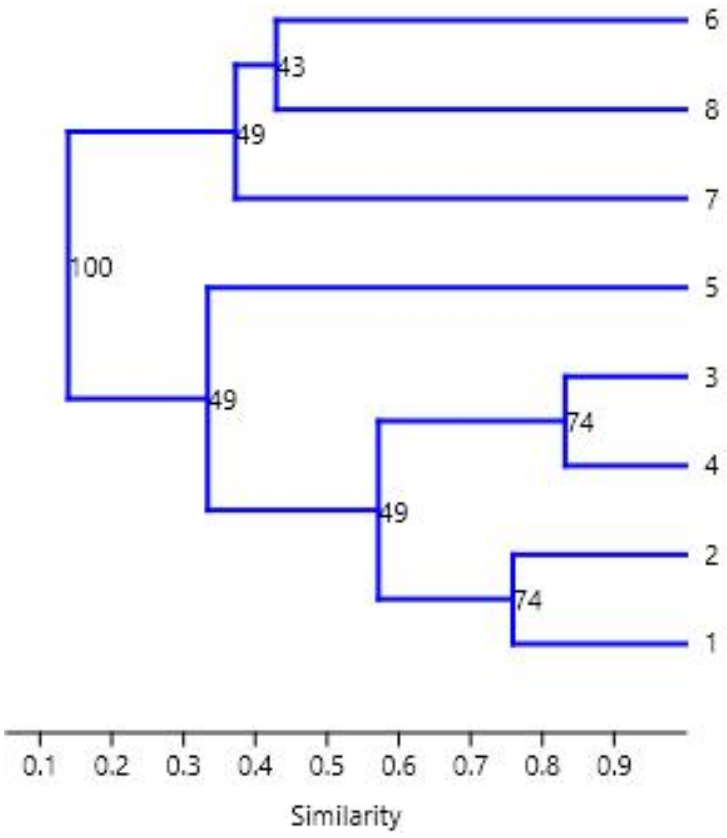

Figure 2. Dendrogram of Harvestman Species Composition Similarity across CSNBR Sites with Bootstrap Support (100 Resamples) at Each Node

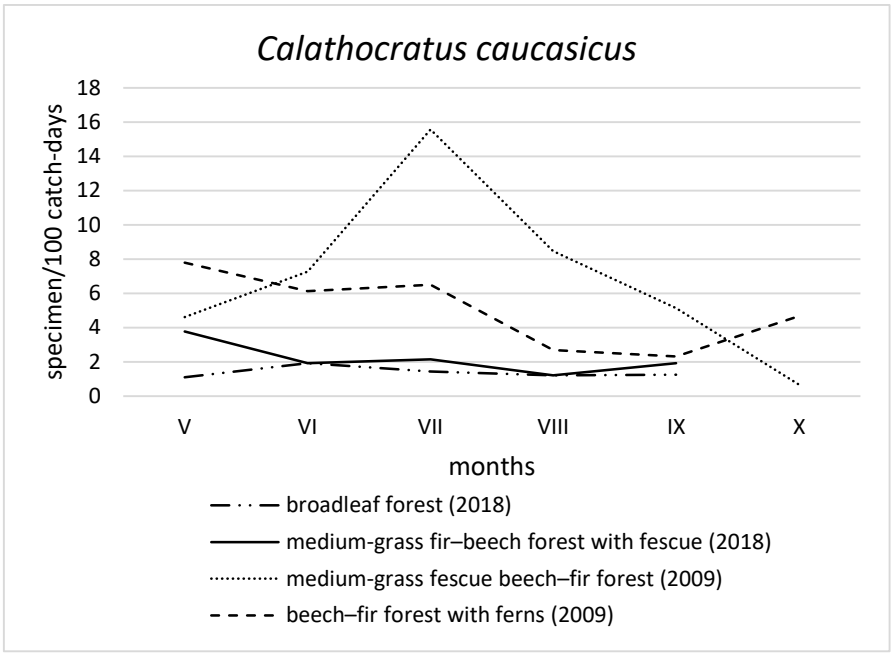

Figure 3. Seasonal Dynamics of Catchability of *Calathocratus caucasicus* at CSNBR Sites

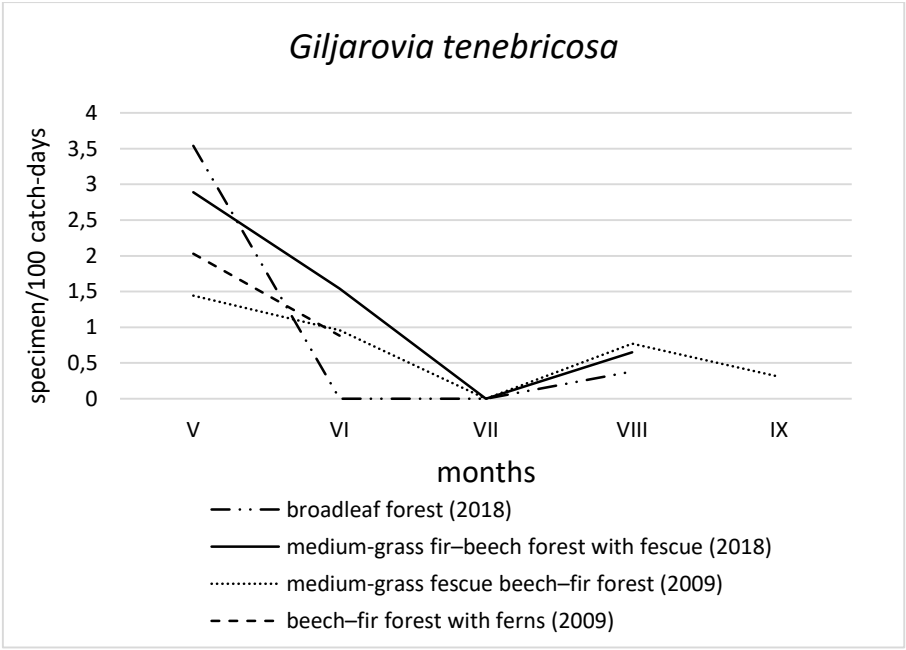

Figure 4. Seasonal Dynamics of Catchability of *Giljarovia tenebricosa* at CSNBR Sites

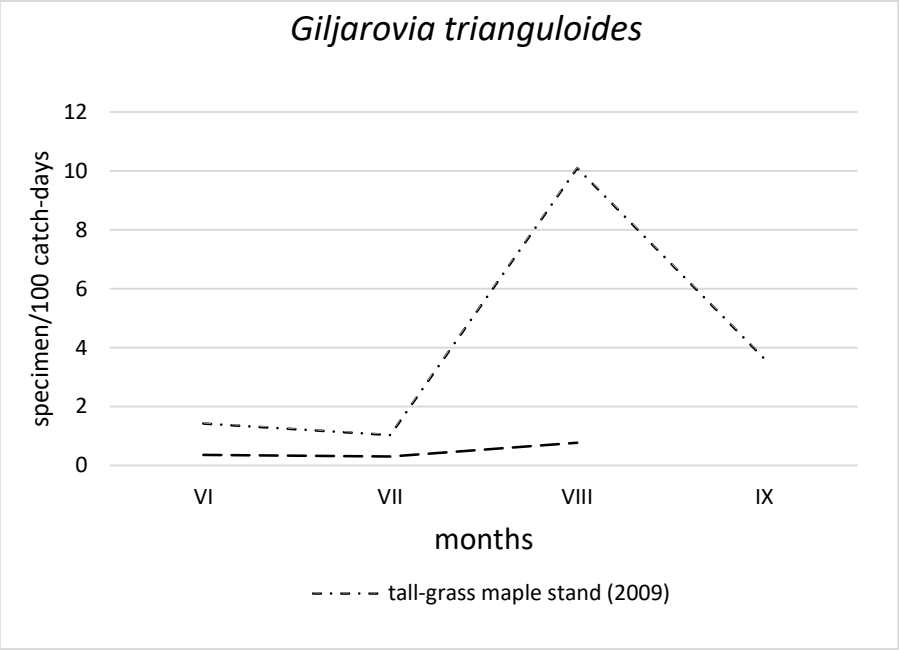

Figure 5. Seasonal Dynamics of Catchability of *Giljarovia trianguloides* at CSNBR Sites

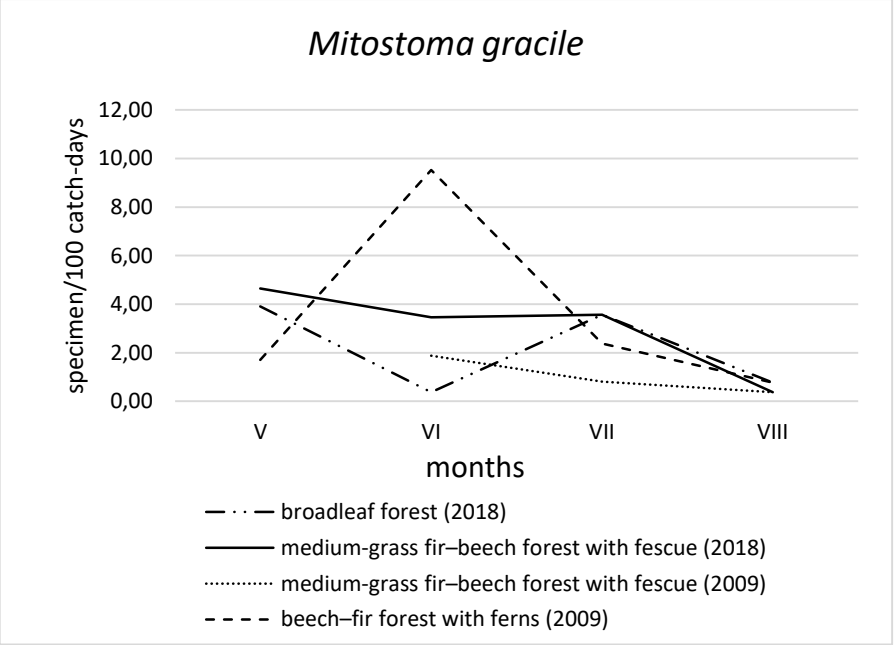

Figure 6. Seasonal Dynamics of Catchability of *Mitostoma gracile* at CSNBR Sites

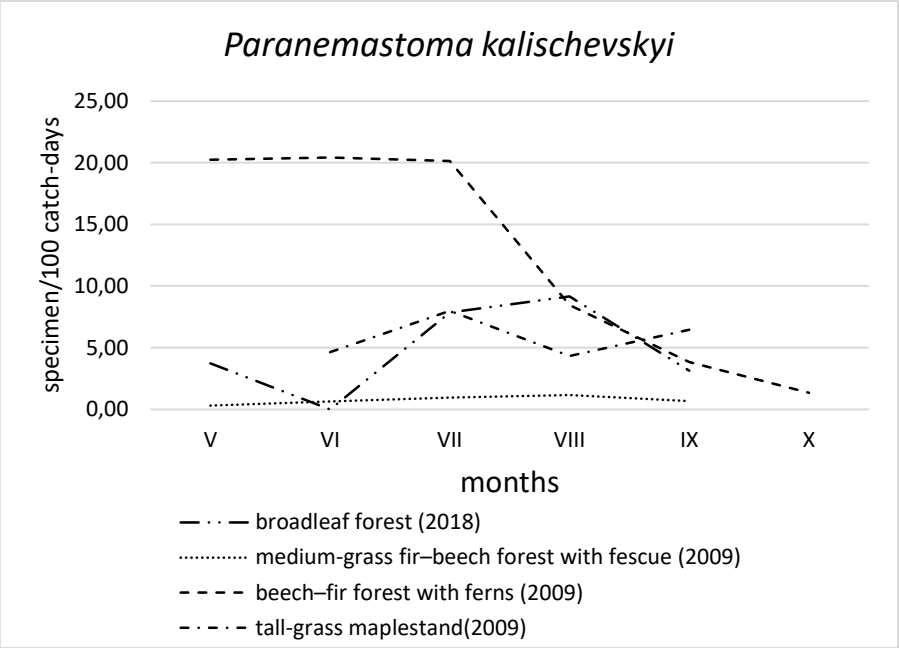

Figure 7. Seasonal Dynamics of Catchability of *Paranemastoma kalischevskyi* at CSNBR Sites

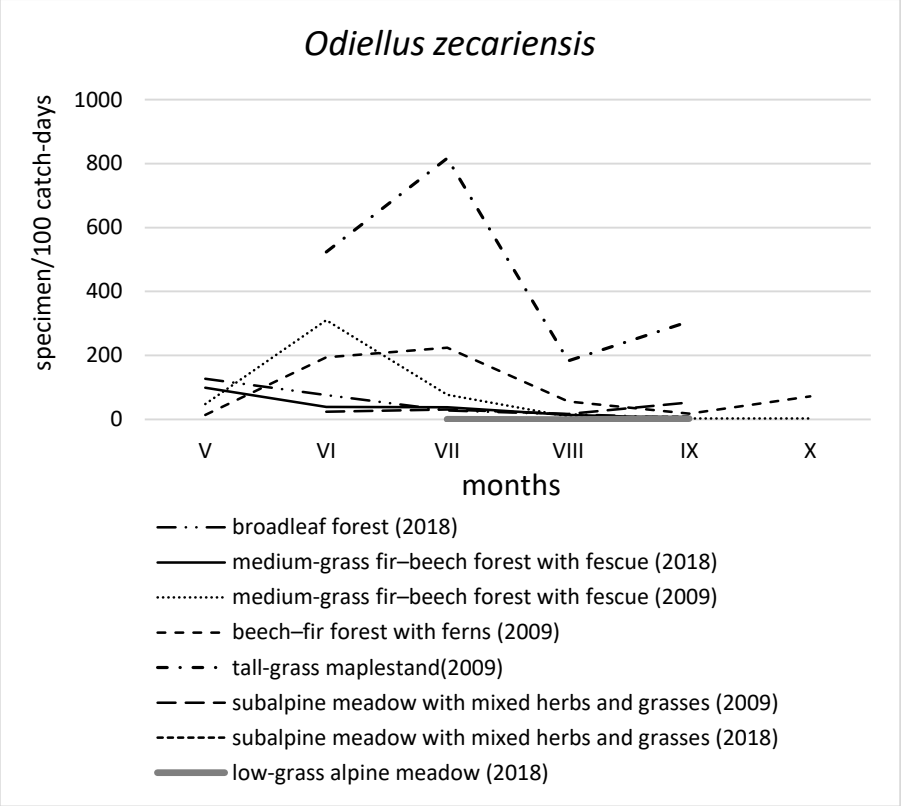

Figure 8. Seasonal Dynamics of Catchability of *Odiellus zecariensis* at CSNBR Sites

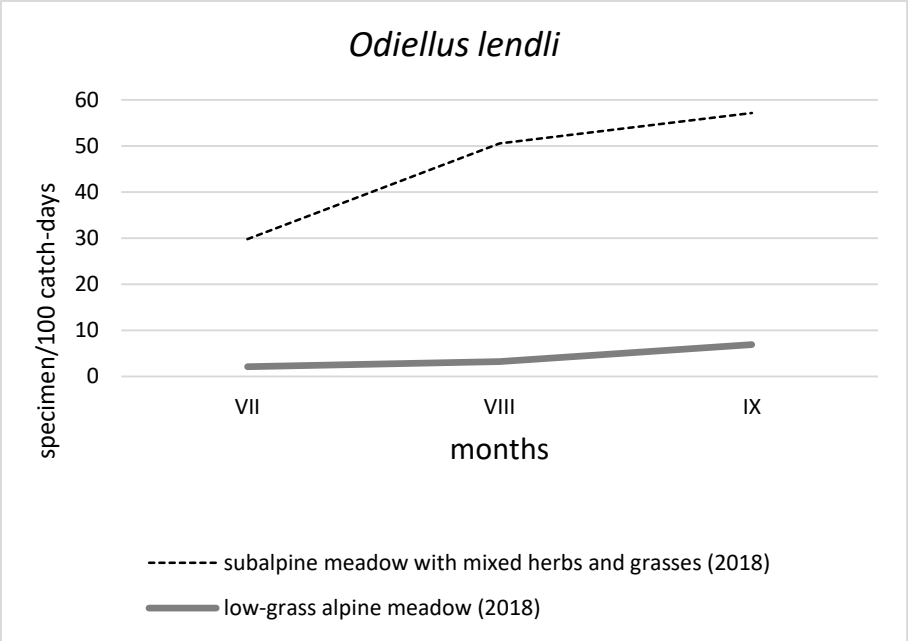

Figure 9. Seasonal Dynamics of Catchability of *Odiellus lendli* at CSNBR Sites

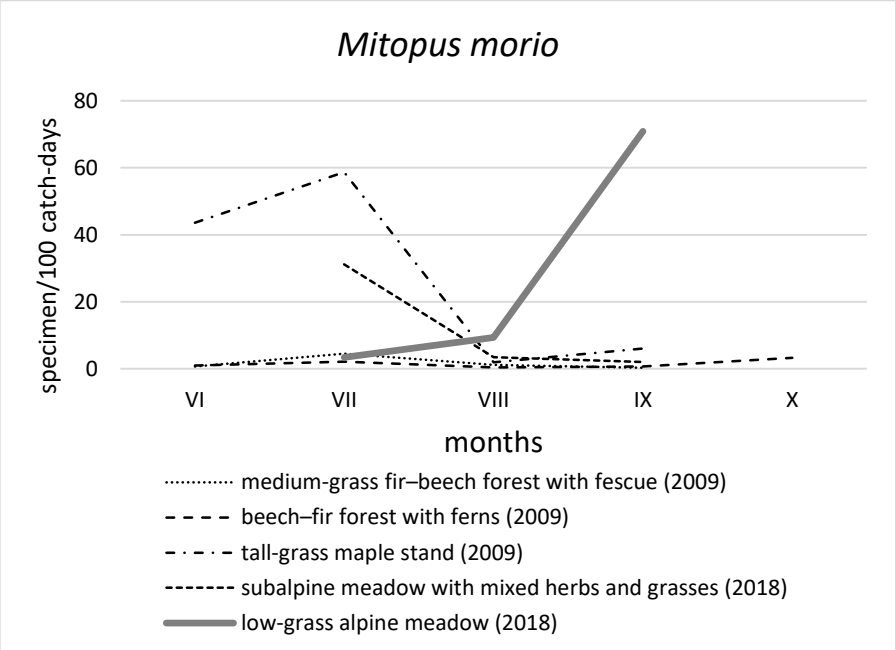

Figure 10. Seasonal Dynamics of Catchability of *Mitopus morio* at CSNBR Sites

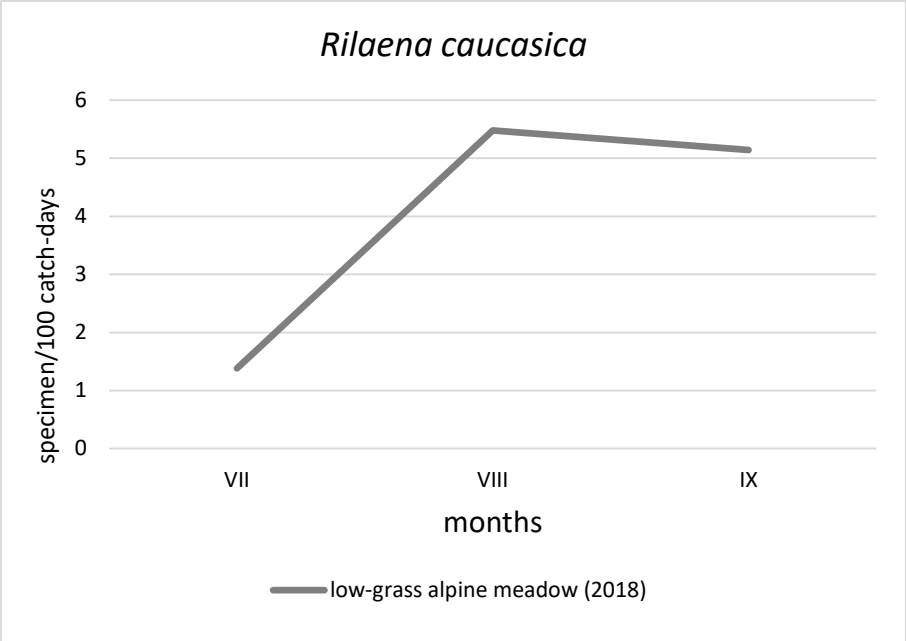

Figure 11. Seasonal Dynamics of Catchability of *Rilaena caucasica* at CSNBR Sites

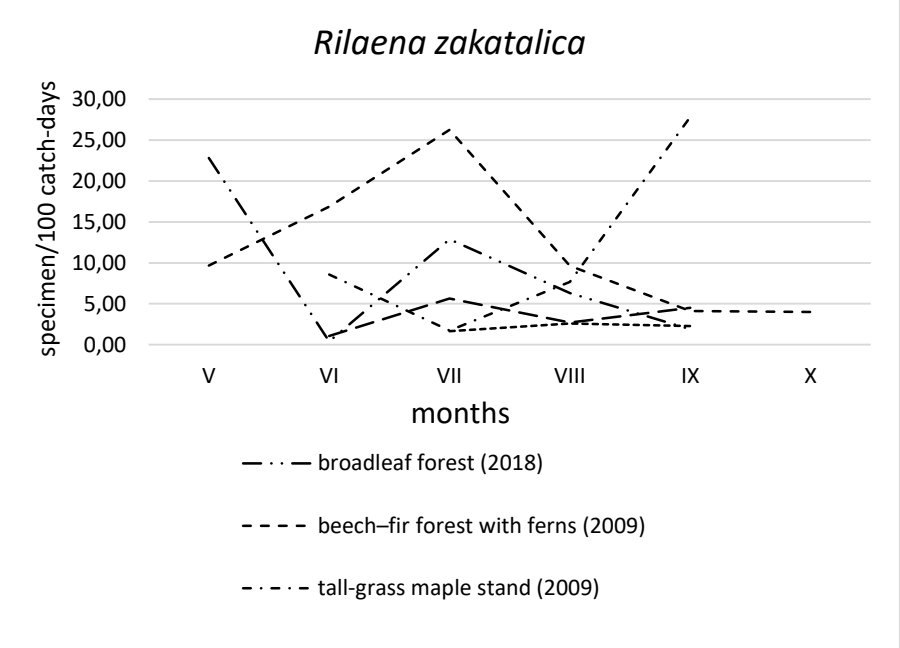

Figure 12. Seasonal Dynamics of Catchability of *Rilaena zakatalica* at CSNBR Sites

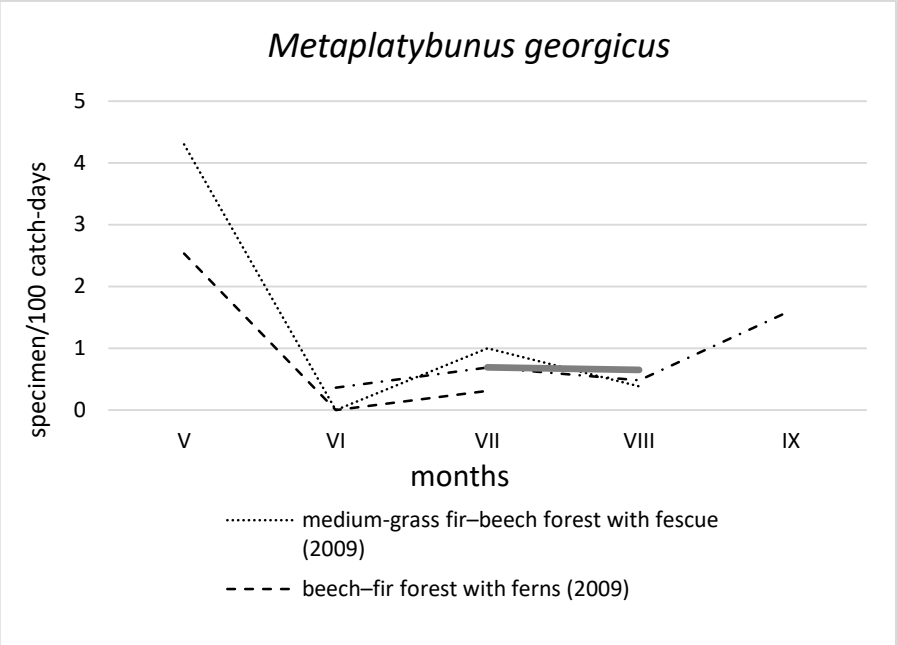

Figure 13. Seasonal Dynamics of Catchability of *Metaplatybunus georgicus* at CSNBR Sites

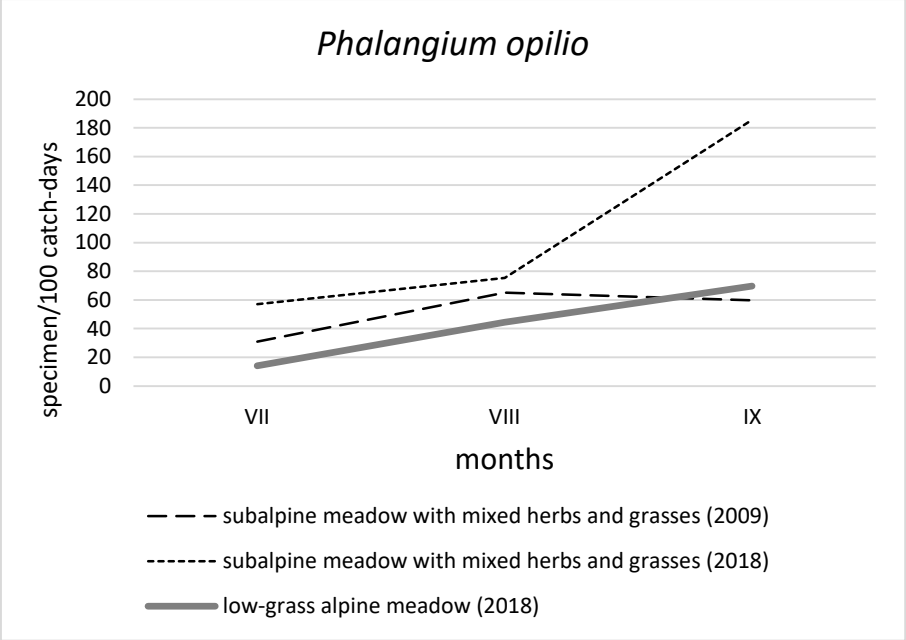

Figure 14. Seasonal Dynamics of Catchability of *Phalangium opilio* at CSNBR Sites