Interim Report July 2024

Duration: October 2023 – July 2024

Background:

In 2023, Kazakhstan's saiga antelope population was recorded at an estimated 1.9 million individuals, based on the records of the spring aerial survey (Krivosheeva, 2023). This figure surpasses the peak numbers reported during the Soviet period, highlighting a significant triumph in conservation efforts. Despite this success, the rising saiga population has sparked increased instances of human-wildlife conflict, particularly with agricultural activities. Farmers have reported various challenges, including saiga herds encroaching on croplands, hay grounds, and pastures, heightening fears of disease transmission to livestock. Additional issues cited by the agricultural community include saigas monopolizing water resources, livestock newborns being lost among migrating saiga herds, and the hygiene and physical disturbances presented by deceased saigas on agricultural lands. These factors have contributed to a growing anti-saiga sentiment among farmers within the Ural population's range and increasing calls for a controlled reduction in saiga numbers and their restriction to designated protected territories (Michel et al., 2023).

Grachev et al. (2023) have stressed the importance of implementing saiga population management strategies to effectively balance their numbers with human land-use needs. To reconcile the interests of saiga conservation with agricultural necessities in the Ural region, the establishment of protected areas was suggested and subsequently realized with the creation of the “Bokeyorda” State Nature Reserve, encompassing 343,040 hectares, and the “Ashiozek” Nature Sanctuary, spanning 314,504 hectares (Grachev et al., 2023) (MAP 1). However, these measures did not fully mitigate the conflicts. Continuous complaints from the agricultural sector in western Kazakhstan led the government to contemplate a regulation (culling of 80,000 saigas) program in October 2022. The proposal faced considerable public resistance, prompting the exploration of alternative solutions. Lacking other viable options to alleviate the rising tensions between human and wildlife populations, the government instituted a population number control program in 2023. This initiative aimed to harvest approximately 300,000 saiga individuals to address the ongoing human-wildlife conflict effectively in the Ural and Betpakdala populations.

Local stakeholders – village leaders, farmers, and the protected areas administration as well as regional nature protection staff – expressed concerns that the high numbers of saiga causes increasing competition with farmers’ livestock and may already exceed the carrying capacity of their habitat. On the other hand, there are large areas of the former saiga habitat in this region are not being used by the animals, although these areas are most likely still suitable for saiga (Michel et al., 2023).

Aim of the study

The aim of this study is to examine the ongoing conflict and to identify a resolution path for the favourable coexistence of humans and saigas in Kazakhstan.

The objectives of the research are:

- To study the ongoing conflict between humans and saigas
- To determine the causes of the conflict/complaints from the local population regarding saigas
- To identify areas with an available biomass as a fodder source for the saiga and livestock
- To identify primary data materials for developing recommendations for decision-makers in the Republic of Kazakhstan

The tasks of my study is to find answers to the following questions:

1. Does a conflict between farmers and the Ural population of saigas truly exist?
2. If the conflict exists, what are its characteristics, specifically, frequency and territories?
3. What are the future perspectives of the saiga conservation in Kazakhstan?

Methods:

Identification of observation areas

In order to conduct plant surveys on an ecological level, it is necessary to differentiate plant formations. Their spatial extension is shown on a vegetation map (MAP 2), which does in return help to understand and manage our environment (Dieterich, 2014). However, due to the understudied nature of the territory in question and the absence of a detailed vegetation map, this study relied on satellite imagery (USGS Landsat collection 2, Level-2) to identify homogenous landscape patches within the research area. Subsequently, in situ verification was conducted to sample areas with uniform vegetation as identified from the satellite data. The data for my study were collected during fieldwork on 108 plots measuring 5x5 meters. Vegetation abundance assessment was conducted by counting species composition and assessing their dominance on each plot.

Vegetation sampling and biomass assessment plots

Depending on the average size of individual plants, different habitat types require different plot sizes in order to include a representative set of species in a vegetation sample, while at the same time keeping observation efforts at a reasonable level (Etzold et. al., 2017). Given the predominance of pastures and hay meadows in our study area, plots of 5x5 meters (25 m^2) were designated for general sampling of vegetation composition and structure, and smaller plots of 3x3 meters (9 m^2) were used for biomass production assessment. Sampling of vegetation composition and structure mainly conducted in fall (October 2023/2024).

The sampling plots were strategically placed to encapsulate the visually recognizable diversity of the vegetation composition and site conditions present at a specific site. These included areas with uniform vegetation cover, areas with scant or no vegetation, and mixed areas where approximately 50% featured high vegetation cover while the remaining 50% had low vegetation cover (Figure 1).

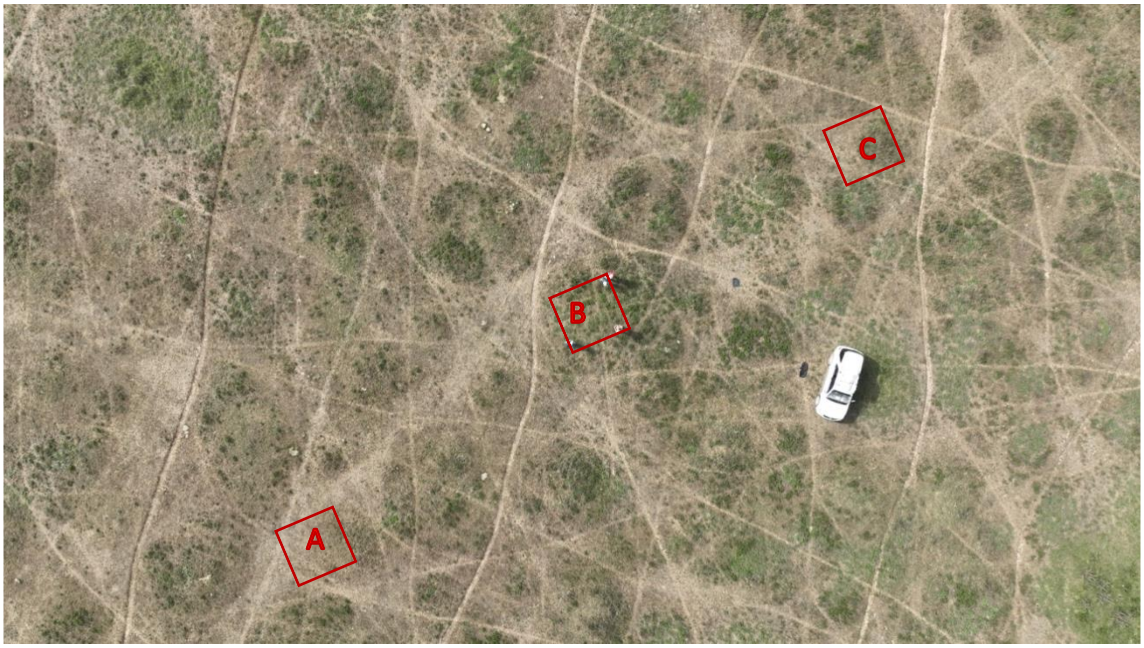


Figure 1. Example of observation sites. A: plot with the minimum vegetation; B: plot with the maximum vegetation; C: mix plot. Elevation 50 m. above the ground. Photo: Aibat Muzbay.

Vegetation composition and structure sampling was conducted according to the ZARCHARIAS/LONDO scale (Table 1) to estimate the species abundance. Moreover, extra information about the height of plants (maximum, minimum and the average mean), litter coverage, saiga/livestock trails, faeces amount (number of droppings), harvest was collected (Annex 1).

Biomass assessment plots were mainly set at the areas which has the most representative value of the site. There were two types of biomass collection plots: open and fenced. Vegetation inside the plots were totally mowed to represent the maximum impact from the herbivores and assess the biomass production in two ways (Figure 2):

1. Biomass growth impacted by herbivory, including separate assessments for the influence of saigas, livestock, and combined grazing pressures.
2. Unimpacted biomass growth, for which plots were fenced to preclude grazing by saigas and/or livestock.

Both types of plots for biomass production assessment were first, described as a standard vegetation sampling plots with collecting all information presented in Annex 1. Then the grass was mowed with scissors and collected with the separation dry and green biomass. All collected biomass were fully dried and weighted.

Figure 2. Examples of fenced and open biomass assessment plots. Poles for the fences were buried at a depth of 50 to 70 cm. Photo: Aibat Muzbay.

Table 1. LONDO AND ZACHARIAS scale for observation plots (Londo 1975, 1984; Zacharias 1996).

ZACHARIAS/ LONDO (1996)	%	Comments
r	<1	1 Ind.
+	<1	2-5 Ind.
0.1	<1	6-50 Ind.
0.1m	<1	>50 Ind.
0.2	1-3	
0.4m	1-3	>50 Ind.
0.4	3-5	
0.4m	3-5	>50 Ind.
1	5-15	
2	15-25	
3	25-35	
4	35-45	
5	45-55	
6	55-65	
7	65-75	
8	75-85	
9	85-95	
10	95-100	

Data analysis

The data from the vegetation survey plots were entered into a spreadsheet, with rows representing individual plots and columns representing plant species and their abundance.

Non-metric multidimensional scaling

For analysing these data using Non-metric multidimensional scaling (NMDS), the R programming environment and the RStudio were chosen for their powerful tools for statistical processing and data visualization.

The analysis process included the following steps:

Data Preparation: Data were cleaned of missing values and normalized to eliminate the potential impact of measurement scale differences.

Choice of Similarity Measure: Bray-Curtis distance, well-suited for ecological data on species composition, was chosen as the similarity measure.

Application of NMDS: Using the "metaMDS" function from the "vegan" package in R, NMDS analysis was performed. This stage involved determining the optimal number of dimensions and minimizing stress to achieve the best data representation.

The results of the NMDS analysis were presented as two-dimensional plot, where points represented individual vegetation sampling plots. The placement of points reflected the similarity of plots based on vegetation species composition: the closer the points, the greater the similarity. This allowed for the identification of patterns and grouping of plots with similar characteristics.

Hierarchical clustering

To understand the structural relationships and groupings in vegetation species composition data, the hierarchical cluster analysis method, specifically using the Ward.D2 method, was selected. This approach allows us to identify internal groups (clusters) among sampling plots based on species abundance, similarity, ensuring the minimization of variance within clusters and maximization of differences between them. Additionally, to assess the stability and reliability of the obtained clusters, a cluster consistency analysis was conducted.

Implementing of hierarchical clustering requires:

Data Collection and Preparation: Vegetation sampling plots were assessed based on species composition and other relevant characteristics, abundance. The data were transformed and standardized for further analysis.

Implementing Hierarchical Cluster Analysis with the "Ward.D2" method: The analysis was performed using the R-studio, allowing for the classification of observational plots into a certain number. The Ward.D2 method was chosen for its ability to minimize the sum of squared differences within each cluster, thereby providing high accuracy and relevance to the clustering.

Cluster Consistency Analysis: After the clusters were formed, their consistency was analysed to evaluate the stability and reliability of the grouping. Cluster consistency analysis helps determine how confidently each plant species can be attributed to a specific cluster, which is critically important for understanding ecological associations and relationships between species.

Vegetation map based on semi-automatic classification plugin in QGIS

Based on collected data from the observation plots on dominant species the map was created using the Geographic Information System (QGIS) software. In QGIS the Semi-Automatic Classification Plugin (SCP) was used which allows for the supervised classification of remote sensing images, providing tools for the download, the preprocessing and postprocessing of images. However, the images were downloaded from the webpage of the U.S. Geological Survey (USGS). As most of our vegetation samplings were conducted in fall, the Landsat 8-9 collection 2 level 2 images were downloaded for 09.11.2023 which perfectly shows conditions of land cover during our field work. Supervised classification was conducted based on the reflectance of the bands 4-3-2 (RBG).

Due to large sizes of pixels (30 m) detailed mapping was not possible. Nevertheless, it was possible to create the map based on Dominant Vegetation Formations (DVF) to minimize the classification error. In total 115 training points were used to create the final map, including 85 training points from our vegetation sampling plots (based on dominant species); 10 training points for the salt pans (solonchak), 10 training points for water bodies (rivers, seasonal streams and lakes); 10 training points for the artificial infrastructures (roofs of the buildings).

Interim results:

In fall 2023, I have conducted vegetation observation of the region. In total 108 plots seized 5x5m^2 each were set to identify main vegetation formations in the working area. The study area was represented with 115 vegetation species, belonging into 28 families. The result of non-metric multidimensional scaling, conducted in R-studio software shows that all sampling plots are similar to each other according to their vegetation composition (figure 3). It confirms that the area is represented by one ecosystem – the short grass-steppe. However, plot 85 stays out which is an observation of solonchak (salt pan) with domination of *Petrosomonia brachiate* and/or *Halocnemum strobilaceum (see in the map 1).*

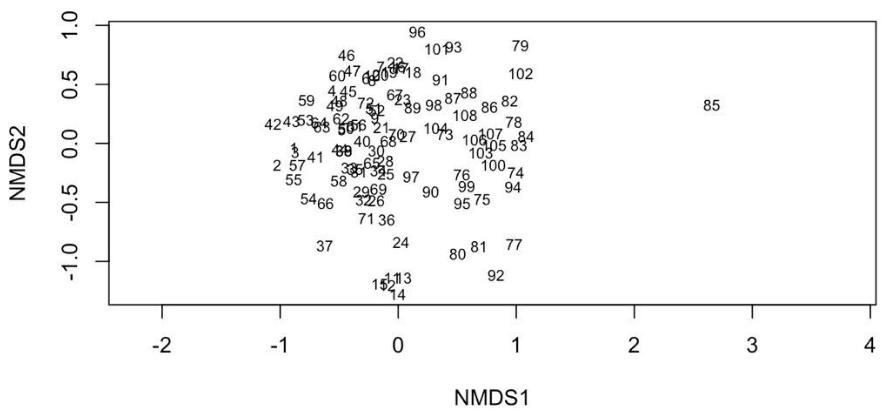


Figure 3. Scheme of a non-metric multidimensional scaling plot. Numbers in the plot represent observation sites (plots). Sites that are more similar (according to the vegetation composition inside the plots) to one another are ordinated closer together. The axes are arbitrary as is the orientation of the plot.

The application of hierarchical cluster analysis with the Ward.D2 method (Figure 4), along with cluster consistency analysis, enables the identification of vegetation groups, suggesting specific ecological niches or environmental conditions i.e. land-use.

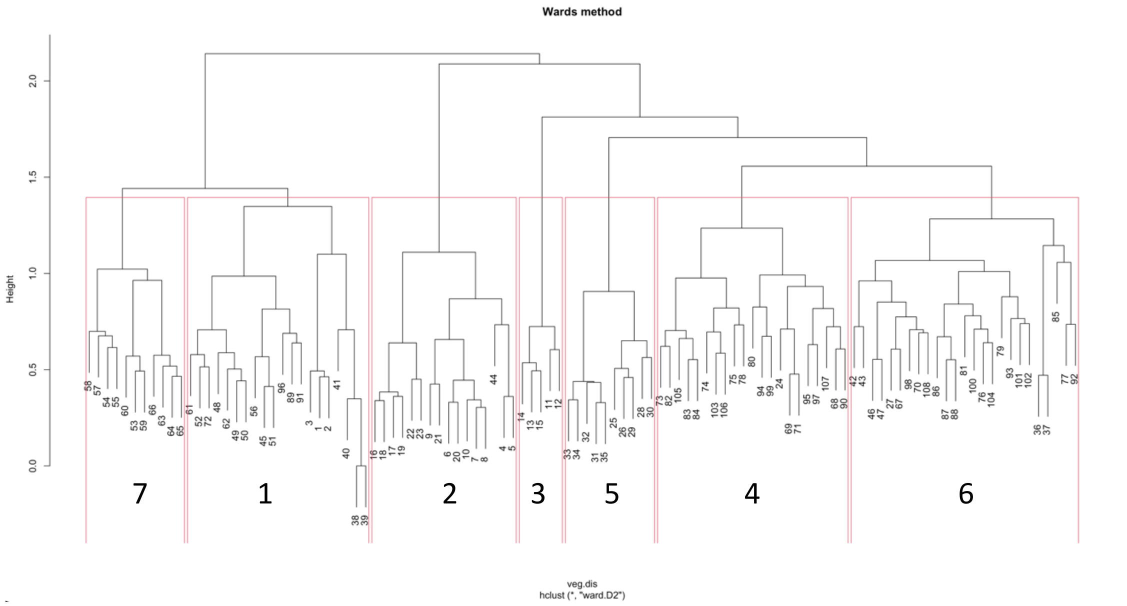


Figure 4. Hierarchical clustering dendrogram based on Ward.D2 method.

Table 2. The values in the cells represent the degree of presence of a particular species in a specific cluster. These values can be interpreted as the probability of a species' membership to the cluster, where 1.00 signifies a 100% membership to the cluster, and an empty space or a dot indicates the absence of data or a zero presence in the given cluster.

Species / Custer	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Festuca valesiaca	1.00	1.00	1.0	0.90	0.5	0.52	0.91
Poa bulbosa	1.00	1.00	.	1.00	1.0	0.92	0.73
Tanacetum achilleifolium	0.80	1.00	0.4	0.86	0.7	0.64	0.45
Stipa capillata	0.10	0.12	1.0	0.24	0.4	0.04	.
Stipa lessingiana	0.10	0.25	.	0.62	0.3	0.12	0.36
Stipa sareptana	.	.	.	0.05	.	.	.
Arabidopsis thaliana	.	.	.	0.19	.	0.04	.
Arabidopsis toxophyla	.	.	.	0.19	.	0.08	.
Artemisia austriaca	0.10	0.12	1.0	1.00	0.9	0.52	0.09
Artemisia lerchiana	0.85	0.12	.	0.33	0.1	0.40	0.82
Artemisia nitrosa	.	.	.	0.19	.	0.08	.
Artemisia pauciflora	.	0.75	.	0.05	.	0.32	.
Artemisia pontica	0.05	.	.	.	.	.	0.09
Achillea millefolium	.	.	0.6	.	.	.	.
Achillea nobilis	0.20	0.12	1.0	0.33	.	0.16	0.27
Androsace filformis	0.05	.	.	0.14	.	0.20	.

Agropyron cristatum	0.20	0.44	0.6	0.05	0.9	0.04	.
Agropyron fragile	0.10	.	.	0.33	.	0.16	.
Alopecurus pratensis	.	.	.	0.10	.	0.04	.
Allium flavescens	.	.	.	0.05	.	.	.
Alyssum desertorum	0.15	.	.	0.19	.	0.12	.
Anabasis salsa	.	.	.	0.05	.	0.12	.
Anisantha tectorum	0.05	.	.	0.14	.	0.16	.
Amygdalus nana	.	.	.	0.05	.	.	.
Eremogone longifolia	.	.	.	0.05	0.1	0.04	.
Astragalus spp	0.10	.	0.2	0.19	.	.	.
Atriplex nitens	.	.	.	.	.	0.08	.
Bassia sedoides	.	0.06	.	0.05	0.2	0.24	.
Bromus squarrosus	0.25	.	.	0.10	.	0.08	0.91
Cachrys odontalgica	0.05	.	.	0.05	.	0.08	.
Carduus uncinatus	0.05	0.06	1.0	0.38	.	0.08	.
Camphorosma monspeliaca	.	.	.	0.05	.	.	.
Carex stenophylla	0.10	.	1.0	0.38	0.1	0.08	.
Capsella bursa pastoris	.	.	.	.	.	0.08	.
Ceratocarpus arenarius	0.20	.	.	0.05	.	0.36	.
Ceratocephala orthoceras	.	.	.	0.33	.	0.28	.
Convolvulus arvensis	0.05	.	.	0.05	.	.	0.09
Erophila verna	.	.	.	0.33	.	0.04	.
Erysimum hieracifolium	.	.	.	0.48	.	0.08	.
Falcaria vulgaris	0.15	.	0.2	0.19	.	0.04	.
Ferula caspica	.	.	.	0.05	.	0.04	.
Frankenia pulverulenta	.	.	.	.	.	0.04	.
Filago arvensis	.	.	0.2	0.10	0.3	0.08	.
Medicago falcata	0.10	.	.	0.19	.	.	0.18
Nepeta ucranica	.	.	0.6	0.10	.	.	.
Serratula dissecta	0.05	.	.	.	.	.	.
Silene spp.	0.20	.	1.0	0.05	0.1	.	0.55
Cirsium spp.	.	0.06	.	.	.	.	.
Climacoptera spp.	0.05	0.31	.	0.05	.	0.20	.
Draba nemorosa	.	.	.	0.05	.	.	.

Descurainia sophia	0.05	0.06	0.4	0.38	0.3	0.48	.
Dianthus spp.	.	.	0.4	0.10	0.2	.	.
Elytrigia repens	.	0.12	.	0.05	.	0.12	.
Euclidium syriacum	.	.	.	.	.	0.04	.
Euphorbia virgata	0.05	0.06	.	0.19	.	.	.
Eremopyrum orienthale	.	.	.	0.14	.	0.16	.
Eremopyrum triticeum	.	.	.	0.14	.	0.32	.
Eryngium planum	.	.	.	0.05	.	0.04	.
Gagea bulbifera	0.10	.	.	0.14	.	0.04	.
Galatella biflora	0.05	.	.	.	.	0.04	.
Galatella tatarica	0.15	0.06	0.2	0.05	0.1	.	.
Galatella villosa	.	0.06	.	0.14	.	.	.
Galium verum	.	.	.	0.10	.	.	.
Gypsophila paniculata	.	.	.	.	.	0.04	.
Hymenolobus procumbens	.	.	.	.	.	0.04	.
Inula salicina	.	.	.	.	.	0.04	.
Jurinea multiflora	.	.	.	0.24	.	.	.
Kochia prostrata	0.35	0.81	.	0.52	0.1	0.48	0.09
Koeleria cristata	0.30	0.06	.	0.52	.	0.20	0.55
Koeleria pyramidata	.	0.06	0.2	0.05	0.3	.	.
Lamium parczoskianum	.	.	.	0.19	.	0.32	.
Lappula patula	0.05	.	.	0.29	.	0.48	.
Lepidium perfoliatum	0.05	.	.	0.29	.	0.28	.
Lepidium ruderale	0.15	.	.	0.24	0.1	0.44	.
Leymus ramosus	0.45	0.06	.	0.38	1.0	0.76	0.82
Limonium gmelinii	.	.	.	0.48	.	0.12	.
Limonium sareptanum	0.40	0.19	0.4	0.10	0.5	0.12	0.27
Myosotis micrantha	.	.	.	0.19	.	0.08	.
Myosurus minimus	.	.	.	0.10	.	0.08	.
Onosma tinctoria	0.20	.	0.2	0.05	.	0.08	.
Ortinhogalum fisherianum	0.05	.	.	0.48	.	0.12	.
Pastinaca clausii	.	.	.	0.05	.	.	.
Petrosimonia brachiata	.	.	.	.	.	0.08	.
Petrosimonia triandra	.	.	.	.	.	0.04	.

Phlomis herba-venti subsp. pungens	0.05	.	0.4	0.24	.	.	.
Phlomoides tuberosa	.	0.06	1.0	0.48	0.5	0.08	.
Poa pratensis	.	.	0.6	.	.	.	.
Polygonum aviculare	0.05	.	.	.	.	0.08	.
Polygonum repens	.	.	0.2	.	.	.	.
Polygonum patulum	0.15	0.19	0.8	0.10	0.9	0.32	0.18
Postinaca clausii	.	.	.	.	.	0.04	.
Potentilla argentea	.	.	.	.	.	0.08	.
Potentilla bifurcata	.	0.06	.	0.19	. 0.08	.	
Potentilla humifusa	.	.	0.8	.	.	.	.
Pucinellia dilicholepis	.	.	.	.	.	0.04	.
Ranunculus spp.	.	.	0.2	.	.	.	.
Rorippa brachycarpa	.	.	.	.	.	0.04	.
Salsula spp.	.	.	.	.	.	0.08	.
Salvia dumetorum	.	.	0.2	.	.	.	.
Senecio glaucus subsp. coronopifolius	.	.	.	.	.	0.08	.
Serratula erucifolia	0.05	.	.	0.10	.	0.04	.
Scabiosa spp.	.	.	.	.	.	0.04	.
Silene dichotoma	.	.	.	.	.	0.04	.
Sisymbrium polymorphum	.	.	0.2	0.05	.	.	.
Spiraea hypericifolia	.	.	1.0	0.24	.	0.04	.
Suadea acuminata	.	.	.	.	.	0.04	.
Taraxacum spp.	.	.	0.6	0.05	.	0.04	0.09
Thalictrum minus	.	.	0.4	.	.	.	.
Trinia hispida	.	.	.	0.14	.	.	.
Tulipa patens	0.05	.	.	0.10	.	.	.
Tulipa schrenkii	0.20	0.06	.	0.10	.	.	.
Valerianella spp.	.	.	0.2	.	.	.	0.09
Verbascum phoeniceum	0.05	.	1.0	0.14	.	0.04	0.18
Veronica verna	.	.	.	0.57	.	0.20	.
Xanthium strumarium	.	.	.	0.05	.	.	.

Poa bulbosa shows complete membership (1.00) in many clusters, indicating its high adaptability and versatility across different ecological conditions. Its presence in most clusters suggests that *Poa bulbosa* can thrive in diverse environments, making it an important component of many ecosystems.

Festuca valesiaca also exhibits a high degree of membership to most clusters, reflecting its widespread distribution and ability to adapt to various conditions. Despite reduced membership in clusters 5 and 6, this species remains a significant participant in many ecological niches.

Leymus ramosus stands out for its high presence in clusters 1, 4, and 7, and perfect membership (1.0) in cluster 6, underscoring its importance in certain ecosystems and its adaptation to specific ecological niches. This species may play a key role in the structure and dynamics of the corresponding ecological communities.

Artemisia austriaca and *Tanacetum achilleifolium* both show significant presence in clusters 1, 2, and 4, indicating their adaptability and potential key roles within certain plant communities. While *Artemisia austriaca* demonstrates constant presence (1.00) in these clusters, emphasizing its specific ecological preferences or crucial role in maintaining ecosystem structure and function. *Tanacetum achilleifolium* displays variable presence, suggesting its flexibility to thrive under diverse ecological conditions.

Stipa capillata represented in cluster 3 as a representative of the in the Soviet Literature described further north distributed long gras steppe is occurring always together with *Festuca valesiaca* and is spatially not wide spread due to the relatively dry climate conditions.

Overall area is represented with short grass steppe vegetation formation under two conditions (map 2):

1. Natural short grass steppe – natural steppe ecosystem with the dominance of specific pasture vegetation like: *Poa bulbosa; Festuca valesiaca* and *Elytrigia repens.*

2. The short grass steppe in succession after abandoned fields and/or overgrazing - is characterized by the presence of *Leymus ramosus*, *Tanacetum achileiflium, Artemisia* species, *Bromus* species and *Agropyron repens* dominant vegetation formations. Abandoned fields – fields which were used during soviet era under the Soviet Virgin Land campaign. Part of these fields are used as the hayfields by local farmers and the other part is in the process of transitioning to the natural steppe pastures.

In addition, during the field work in fall 3 sites were constructed as the plots for monitoring of the biomass production. These plots seized 3x3m^2 were fenced to exclude human, saiga and/or livestock impact to identify maximum vegetation growth and biomass production. All the existing initial biomass inside were mowed right before fencing.
Same plots but without the fences (open plots) were also set in order to study the vegetation growth and biomass production under the impact of livestock and wildlife. These plots were also mowed but not fenced.

In spring 2024, I have conducted my next travel to the study area to identify calving grounds of saiga antelope. In total more than 140 000 saiga females were counted in calving areas. These calving areas are the hotspot of ongoing conflict as huge saiga herds are accumulating in one area and give birth to thousands of calves. In 2024, at least 60 farmlands were directly affected by calving of saiga antelope (map 1).

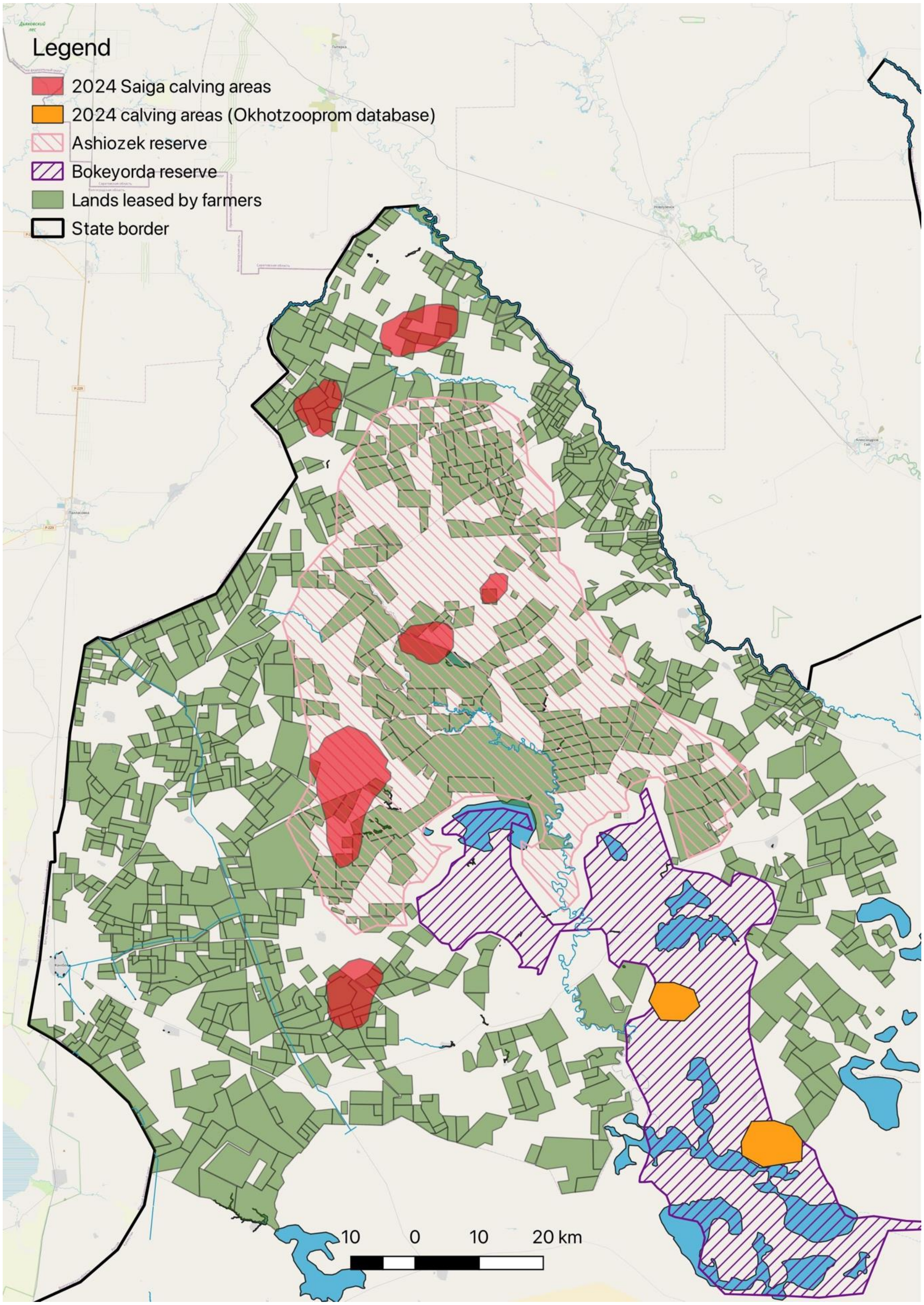
Further work:

One of the most important parts of the work is going to be implemented in fall 2024 – collection of biomass from the biomass collection plots. This action needs to be done only in fall as the vegetation period will be fully completed.

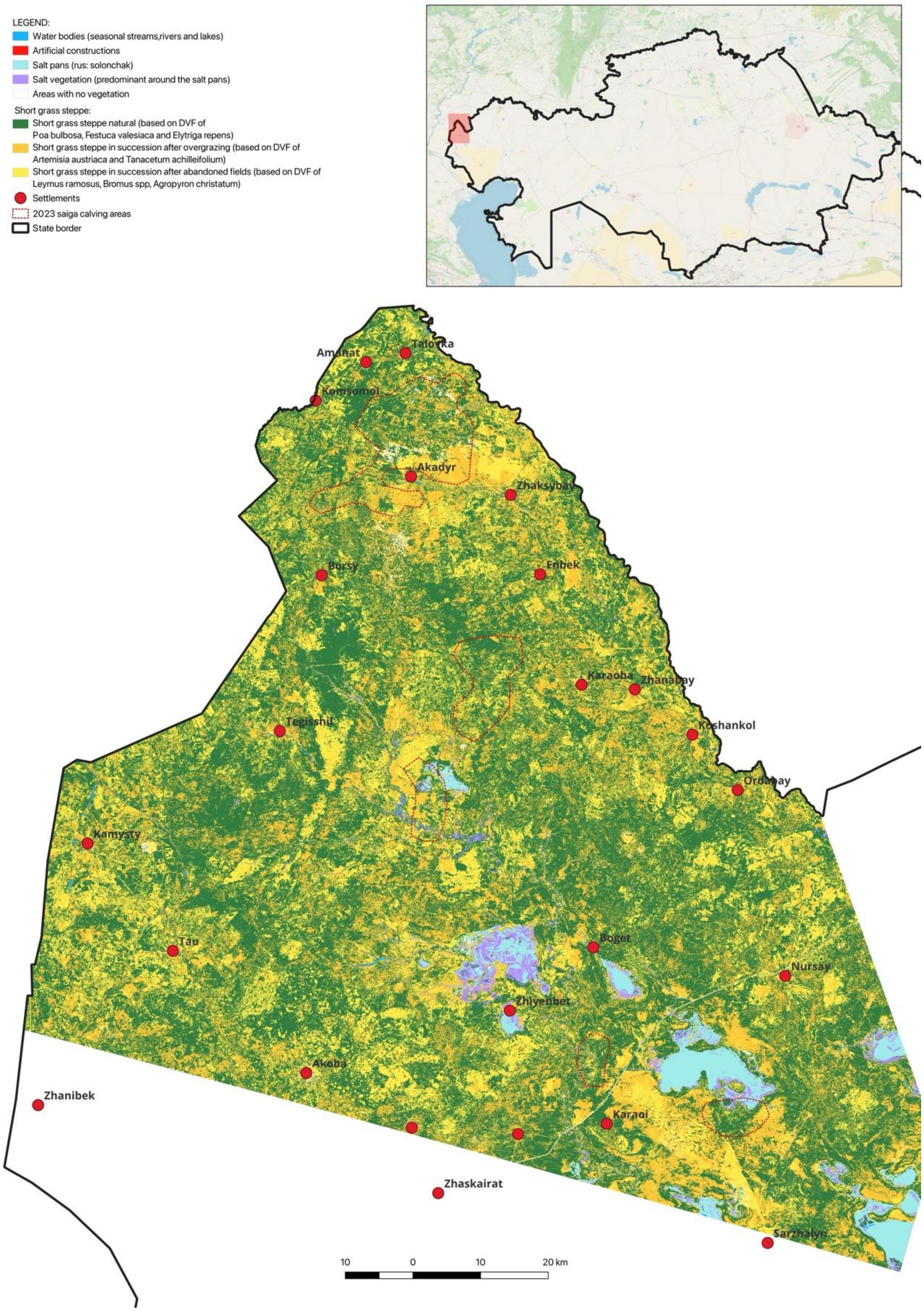
List of literature:

1. Krivosheeva A. (2023):Saiga numbers in Kazakhstan approaching 2 million. Saiga News, 29/2023, p. 10
2. Michel S., Dieterich T., Lohe R., Muzbay A. (2023) Take them or leave them in the steppe? Potential uses of saiga horn from natural mortality. Saiga News, 29/2023, p. 37
3. Grachev Yu., Begilov T., Eszhanov E. (2023): Dynamics of the number of saigas of the Volga-Ural population over the past 40 years and factors affecting it. Al-Farabi Kazakh National University, 10 pp
4. Dieterich T. (2014): Handbook on Methods for Field Courses Department of BioEcology, Faculty of Ecology and Soil Science, Baku State University Azerbaijan, English Version. 67 pp
5. Etzold, J., Hirschelmann, S., Kaiser, V., Manthey, M., Dieterich T. Leeuw J, Köppler M. (2017): Landscape-ecological excursion field guide, based on an Azerbaijani-German student excursion to Northeastern Azerbaijan, GIZ: Baku,Azerbaijan, 260 pp

MAP 1.


Legend
2024 Saiga calving areas
2024 calving areas (Okhotzooprom database)
Ashiozek reserve
Bokeyorda reserve
Lands leased by farmers
State border
10 0 10 20 km

MAP 2


LEGEND:
Water bodies (seasonal streams,rivers and lakes)
Artificial constructions
Salt pans (rus: solonchak)
Salt vegetation (predominant around the salt pans)
Areas with no vegetation
Short grass steppe:
Short grass steppe natural (based on DVF of Poa bulbosa, Festuca valesiaca and Elytriga repens)
Short grass steppe in succession after overgrazing (based on DVF of Artemisia austriaca and Tanacetum achilleifolium)
Short grass steppe in succession after abandoned fields (based on DVF of Leymus ramosus, Bromus spp, Agropyron christatum)
Settlements
2023 saiga calving areas
State border
Amanat
Talovka
Komsomol
Akadyr
Zhaksybay
Borsy
Enbek
Karaoba
Zhanabay
Koshankol
Tegisshil
Ordabay
Kamysty
Tau
Bogot
Nursay
Zhiyenbet
Akoba
Zhanibek
Karaoi
Zhaskairat
Sarzhalyn
10 0 10 20 km

Annex 1. Vegetation observation form

Head data vegetation and biomass sampling / _______________ 20___ / Ural

Basic data			
Plot-ID			
Date			
Team members			
Plot size (m x m)			
Plot location			
Longitude			
Latitude			
Accuracy (in m)			
Relief position			
Inclination			
Exposition			
Cover herb layer (%)			
Maximum height herbs (cm)		Mean height (cm)	
Moss layer (%)			
Litter layer (%)			

Plot-ID:

Species name	**Cover class**	**Comment**
	Londo	