



A short illustrated handbook

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# BIOTOPES, KEY SPECIES FLORA AND FAUNA IN TCO PARTNERSHIP TERRITORY



Association for the Conservation  
of Biodiversity of Kazakhstan



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## INTRODUCTION

This field handbook has been produced for the TCO Environmental Specialists and other stakeholders, as an aid in the identification of habitats, plants and animals found in the project area. A biotope is an ecological categorization which combines biological features (plant and animal communities), physical and chemical habitat characteristics.

This brief illustrated guide consists of three main sections, which describe the features of the identified biotopes and provide brief information on the most typical indicator species, as well as rare species of flora and fauna that require special attention specific to each habitat.

There are seven biotopes in the TCO Partnership Territory as identified by baseline ecological studies undertaken and the FGP ESHIA:

- Hilly-ridge sandy desert with wheat-grass-sagebrush, sagebrush (*Agropyron fragile* (Roth) Nevski - *Artemisia lercheana* Web., *Artemisia terrae-albae* Krasch.) vegetation in places with *Kochia prostrata* (L.) Schrad, *Krascheninnikovia ceratoides* (L.) Gueldenst, ephemeral species on sands, brown solonchak and solonetzic soils;
- Coastal solonchak desert with *Halocnemum strobilaceum* (Pall.) and annual *salsola* vegetation and in some places with ephemeral plants with *Artemisia monogyna* Waldst. et Kit. on meadow seaside solonchak soils and coastal solonchaks;
- Marsh plain with sparse *Halocnemum strobilaceum* (Pall.) and saltwort (*Salicornia europaea* L.) vegetation on primitive seaside salinized soils;
- Sor depressions without vegetation, surrounded by *Halocnemum strobilaceum* (Pall.) vegetation;
- Artificial domestic wastewater ponds with reed (*Phragmites australis* Cav.) vegetation;
- Technogenically damaged lands;
- Residential and adjacent territories.

203 species of vascular plants, 1 species of amphibians, 12 species of reptiles, 198 species of birds and 34 species of mammals were recorded in these biotopes.

## SECTION



# BIOTOPES

# BIOTOPE 1.

***Hilly-ridge sandy desert with grass-wormwood-shrub vegetation which comprises wheat-grass-sagebrush, sagebrush (*Agropyron fragile*), *Artemisia lercheana*, *Artemisia terrae-albae* vegetation in places with *Kochia prostrata*, *Krascheninnikovia ceratoides*, ephemeral species on sands, brown solonchak and solonetzic soils***

A sandy desert with grass-wormwood-shrub vegetation occupies the eastern part of the TCO Partnership territory. It is represented here by the Caspian Karakum, most of which are slightly hummocky, stable sands. A smaller area is occupied by semi-mobile or mobile sand dunes, with a very sparse vegetation cover. Mobile dune sands are also found in small areas (the area of the former Sarykamys settlement). Peripheral areas of sandy massifs are smooth sand aprons. There are many sors, especially in the northern part.

## KEY AND INDICATOR SPECIES

***Flora:*** *Agropyron fragile* (*Siberian wheatgrass*), *Artemisia terrae-albae*, *Artemisia lercheana*, *Eremopyrum orientale* (*Oriental false wheatgrass*), *Climacoptera*, *Kochia prostrata* (*Forage kochia*), *Krascheninnikovia ceratoides* (*Pamirian winterfat*).

***Fauna:*** Steppe Agama lizard (*Trapelus sanguinolentus*), Dione Snake (*Dione's Rat Snake - Elaphe dione*), Steppe Ribbon Snake (*Steppe Ribbon Racer - Psammophis lineolatus*), Lesser Short-toed Lark (*Calandrella rufescens*), Blue-cheeked Bee-eater (*Merops persicus*), Steppe Grey Shrike (*Lanius pallidirostris*), Desert Wheatear (*Oenanthe deserti*), Long-eared Hedgehog (*Hemiechinus auratus*), Yellow Souslik (*Spermophilus fulvus*), Great Gerbil (*Rhombomys opimus*), Tolai Hare (*Lepus (capensis) tolai*), Wolf (*Canis lupus*), Red Fox (*Vulpes vulpes*), Saiga antelope (*Saiga tatarica*).



BIOTOPE 1.

# BIOTOPE 2.

***Coastal solonchak desert with Halocnemum strobilaceum and annual salsola vegetation and in some places with ephemeral plants with Artemisia monogyna on meadow seaside solonchak soils and coastal solonchaks***

The solonchak desert occupies about half of the TCO Partnership area with highly sparse vegetation and extensive area of sors - depressions with abundant salt outcrops moistened by groundwater. The salty mud of many sors makes them muddy and impassable. Their central part is free of vegetation and animal population, with the exception of bacteria and some invertebrate halophytes. The solonchak desert is inferior to the sandy desert in terms of both vertebrate's species composition and their population density.

## KEY AND INDICATOR SPECIES

**Flora:** *Halocnemum strobilaceum*, *Climacoptera crassa*, *Salsola paulsenii*, *Artemisia monogyna*.

**Fauna:** Steppe Agama lizard (*Trapelus sanguinolentus*), Dione Snake (Dione's Rat Snake - *Elaphe dione*), Steppe Ribbon Snake (Steppe Ribbon Racer - *Psammophis lineolatus*), Lesser Short-toed Lark (*Calandrella rufescens*), Long-eared Hedgehog (*Hemiechinus auratus*), Libyan Jird (*Meriones libycus*), Tolai Hare (*Lepus (capensis) tolai*), Wolf (*Canis lupus*), Corsac Fox (*Vulpes corsac*), Saiga antelope (*Saiga tatarica*).



BIOTOPE 2.

# BIOTOPE 3.

***Marsh plain with sparse *Halocnemum strobilaceum* and saltwort (*Salicornia europaea*) vegetation on primitive seaside salinized soils***

Between the dam of the Caspian Sea on the western side and the sandy massifs on the eastern side, there is a solonchak marsh plain, which is characterized by either sparse or more dense sagebrush-saltwort vegetation cover. Significant areas are occupied by sors here; takyr-like areas, which are almost devoid of vegetation, are less common.

## KEY AND INDICATOR SPECIES

***Flora:*** *Halocnemum strobilaceum*, *Salicornia europaea* (saltwort).

***Fauna:*** Dione Snake (Dione's Rat Snake - *Elaphe dione*), Steppe Ribbon Snake (Steppe Ribbon Racer - *Psammophis lineolatus*), Kentish Plover (*Charadrius alexandrinus*), Lesser Short-toed Lark (*Calandrella rufescens*), Long-eared Hedgehog (*Hemiechinus auratus*), Libyan Jird (*Meriones libycus*).



BIOTOPE 3.

# BIOTOPE 4.

*Sor depressions without vegetation, surrounded by Halocnemum strobilaceum vegetation*

The coastal lowlands (coastal areas of the Caspian Sea) are represented by marsh areas adjacent to the sea, which until recently were the sea bed. Current vegetation was formed in inconstant hydrological regime, under the conditions of wind effected phenomena. Pools in bog are formed in depressions by the winds from the sea.

On the territory of sors, the species composition is depleted and represented by plant communities resistant to high salt content in soils and by salt tolerant animal species.

## KEY AND INDICATOR SPECIES

**Flora:** *Halocnemum strobilaceum*.

**Fauna:** Kentish Plover (*Charadrius alexandrinus*).



BIOTOPE 4.



# BIOTOPE 5.

## ***Artificial domestic wastewater ponds with reed (Phragmites australis) vegetation***

With the purpose of sanitary drainage of domestic-household wastewater evaporation fields were built near shift camps of TCO, Shanyrak, Tengiz, industrial base facilities. They are large area artificial reservoirs. Since the time they were created, reed thickets have widely grown on all such reservoirs, which allows us to consider them as analogues of reed-flood lakes.

Artificial ponds are reservoirs of wastewater where significant amount of organic and chemical substances are settled as sediments. They are peculiar elements of the landscape. Vegetation is represented mainly by *Phragmites australis* and hydrophyte species. Reed thickets, in turn, ensure the existence of the corresponding faunistic complex.

### KEY AND INDICATOR SPECIES

**Flora:** *Phragmites australis*.

**Fauna:** Green Toad (*Bufo viridis*), Eastern Steppe Viper (Orsini's Viper - *Vipera renard*), White-headed Duck (*Oxyura leucocephala*), White-tailed Eagle (*Haliaeetus albicilla*), Pallas's Gull (*Larus ichthyaetus*), Black-headed Gull (*Larus ridibundus*), Caspian Gull (*Larus cachinnans*), Northern Lapwing (*Vanellus vanellus*), Wolf (*Canis lupus*), Corsac Fox (*Vulpes corsac*), Red Fox (*Vulpes vulpes*).



BIOTOPE 5.

# BIOTOPE 6.

## *Technogenically damaged lands*

During construction operations, quarrying, off-road traffic and other operations, the natural topography and soil and vegetation cover were damaged in some areas. Such areas can be attributed to a separate type of habitat - technogenically damaged lands. Vegetation, as a rule, is represented by pioneer groups with a predominance of annuals and invasive species. In quarries that have undergone biological reclamation, there are plantings of *Haloxylon aphyllum*, *Tamarix*, *Kochia prostrata*. The species composition of the fauna, as a rule, is depleted; at the same time, due to changes in the flat relief and its complications, there are certain advantages for burrowing animals and inhabitants of cliffs.

### KEY AND INDICATOR SPECIES

**Flora:** *Kochia prostrata*, *Tamarix* sp., *Artemisia* sp., *Phragmites australis*.

**Fauna:** Steppe Agama (*Trapelus sanguinolentus*), Steppe Grey Shrike (*Lanius pallidirostris*), Blue-cheeked Bee-eater (*Merops persicus*), European Bee-eater (*Merops apiaster*), Sand Martin (*Riparia riparia*), Pied Wheatear (*Oenanthe pleschanka*), Desert Wheatear (*Oenanthe deserti*).



BIOTOPE 6.

# BIOTOPE 7.

## *Residential and adjacent territories*

This biotope includes the territories of work sites, shift camps (both temporary and permanent) and the territories adjacent to them (engineering and transport networks). In anthropogenic biotopes, synanthropic species of fauna predominate; vegetation is represented by species spread from neighboring biotopes, cultivated plantings and invasive species.

### KEY AND INDICATOR SPECIES

**Flora:** *Elytrigia* sp., *Artemisia* sp., *Chenopodium* sp., *Achillea* sp.

**Fauna:** Green Toad (*Bufo viridis*), Steppe Agama (*Trapelus sanguinolentus*), Dione Snake (Dione's Rat Snake - *Elaphe dione*), Red-backed Shrike (*Lanius collurio*), Barn Swallow (*Hirundo rustica*), White Wagtail (*Motacilla alba*), House Sparrow (*Passer domesticus*), Desert Finch (*Rhodospiza obsoleta*), Long-eared Hedgehog (*Hemiechinus auratus*), House Mouse (*Mus musculus*).



BIOTOPE 7.

SECTION

2

# FLORA

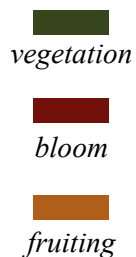
On the territory of the TCO Partnership, 203 species of higher plants belonging to 40 families were registered.

The Tengiz project are belongs to the Caspian floristic region (according to the floral zoning scheme of Kazakhstan), covering part of the northern and north-eastern regions of the Caspian Lowland within the desert zone. The peculiarity of the region's flora is that it has low floral diversity dominated by members of the Goosefoot (*Amaranthaceae*) family.

A feature of the desert zone is the predominance of halophilic (salt tolerant) type shrubs and an abundance of annual species, especially of an ephemeral (very short) development cycle.

This guide includes background and key indicator species of biotopes and communities represented on the territory, as well as rare and endangered plant species included in the Red Data Book of the Republic of Kazakhstan and in the International Red List (IUCN).

## LEGEND

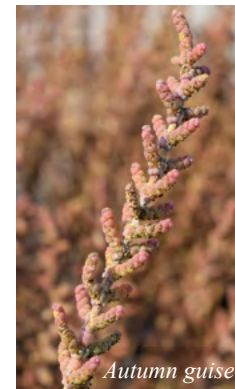


## *Halocnemum strobilaceum* (Pall.)

*Amaranthaceae* Family

**Status or value:** fodder, insecticidal.

**Description:** A small semi-shrub 5-40 cm tall, forming circles or mounds with open, densely branched and mostly rooting branches. Leaves are not developed, in the form of scales. The yellow flowers are sitting in a pocket. Distributed on wet and puffed solonchaks, sors, the shores of salt lakes, rivers of steppe, semi-desert and desert part of Kazakhstan. (photo - Vladimir Kolbintsev, Tulkin Tillaev).



**Similar species:**

*Salicornia europaea* L. (photo - Andrey Kovalchuk)

*Halocnemum strobilaceum* has a more creeping crown, the color of the stems is paler, the branches are much shorter than that of the *Salicornia*.



**Halostachys belangeriana (Moq.) Botsch** (photo - Yuri Pirogov).

*Halostachys belangeriana (Moq.)* is distinguished by its larger size - up to 3.5 m in height, as well as relatively longer branches.



**Flowering and fruiting:**



**Biotope:** 2,3,4



**Climacoptera crassa (M. B.) Botsch.**

*Amaranthaceae Family*

**Status or value:** fodder, dyeing.

**Description:** Annual, 5-50 cm tall. The plant is covered at first with long matted pubescence, later almost naked. Flowers 12-18 mm in diameter. Grows on crustal solonetz, sors and solonchaks of Ustyurt, Caspian and Aral Sea regions. (photo - Maxim Kucherov, Sergey Bulanov).



**Flowering and fruiting:**



**Biotope:** 1,2,3



## *Climacoptera brachiata* (Pall.) Botsch.

*Amaranthaceae* Family

**Status or value:** fodder.

**Description:** Annual, 10-30 cm tall, with straight finely branched stem from the base. Branches and leaves, with the exception of bracts, are opposite, appressed-hairy. The seeds are upright. It grows on solonetz, clay-gravelly trails, in depressions among the sands of all deserts of Kazakhstan. (photo - Galina Chulanova).

**Similar species:**

*Salsola paulsenii* Litv. (photo - Yuri Danilevsky).

*Climacoptera brachiata* differs from *Salsola paulsenii* by more elongated fleshy leaves, a thin stem, fruits with pinkish wings sitting in groups, unlike single ones in *Salsola paulsenii*.

**Flowering and fruiting:**

1	2	3	4	5	6	7	8	9	10	11	12
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**Biotope:** 1



## *Salsola paulsenii* Litv.

*Amaranthaceae* Family

**Status or value:** fodder.

**Description:** Annual, 15-60 cm tall. Stem strongly branched from the base, densely covered with short bristles. The leaves are alternate, narrowly linear, widened at the base. The seeds are horizontal. Grows on the desert sands of all Kazakhstan. (photo: Yuri Danilevsky).



**Similar species:**

**Salsola nitraria Pall.**

(photo – Vladimir Epiktetov).

*Salsola nitraria* differs by longer horizontal leaves without pronounced needles at the ends



**Flowering and fruiting:**



**Biotope:** 2,3

***Agropyron fragile (Roth) Nevski***

*Poaceae Family*

**Status or value:** fodder.

**Description:** A perennial loose shrub 50-100 cm high. The stem is straight, almost glabrous or hairy, rough under the spike. The leaves are narrowly linear, flat or curled, glabrous, smooth below, rough above or densely hairy on both sides. Ear dense, linear, 5-15 cm long, 5-12 cm wide; its awn is rough or hairy. It grows on sandy steppes and sands. (photo: Mikhail Knyazev, Alexander Fateryga).





**Similar species:**

*Elytrigia repens* has very long creeping rhizomes, as well as a transverse groove on the seeds at the base of the spikelet scales, which is not found in *Agropyron fragile*.



**Flowering and fruiting:**



**Biotope:** 1

***Elytrigia repens* (L.) Nevski**

**Poaceae Family**

**Status or value:** fodder, weed.

**Description:** Perennial herb 40-150 cm high with long creeping underground rhizomes. Leaves glabrous, flat, linear, 15-40 cm long, 3-10 mm wide at the base of the plant. The flowers are small, light, collected in a rare spike inflorescence. It grows on plains and in the mountains, on solonchaks with various degrees of humidification. Sometimes it predominates in herbage in floodplain meadows and fallow lands. (photo – Pavel Evseenkov, Anatoly Lisitsyn)



**Similar species:**

**Agropyron fragile (Roth)  
Nevski**

*Elytrigia repens* has very long creeping rhizomes, and a distinctive feature - the seeds have a transverse groove at the base of the spikelet scales, which *Agropyron fragile* does not have. (photo - Alexander Fateryga)



**Flowering and fruiting:**



**Biotope: 7**

**Artemisia terrae-albae Krasch.**

**Asteraceae Family**

**Status or value:** fodder, ethereal.

**Description:** Semi-shrub 10-45 cm tall. Young shoots are colored in white tones, later become grayish-green from cobweb-tomentose pubescence. The root is woody, upright and rather thick. Flowers in the amount of 4-5 pcs. collected in a loose short panicle. Grows throughout desert Kazakhstan. (photo: Lomonosov Moscow State University Living Systems Depository).



**Similar species:**

**Artemisia pauciflora** Web (photo - Maxim Zaitsev).

It is characteristic for *Artemisia pauciflora*, a complete drying of leaves and exposure of dark stems (hence the name «Black wormwood»), while for *Artemisia terrae-albae*, which is called white-earth wormwood, the color of an adult plant is grayish-green.



**Flowering and fruiting:**



**Biotope:** 1

**Artemisia monogyna** Waldst. et Kit.

*Asteraceae* Family

**Status or value:** fodder, ethereal.

**Description:** Perennial, 30-50 cm tall. The plant does not form tussock. The lower stem leaves are long-petiolate. The terminal leaf lobules are narrowly linear or linear. Fertile stems are densely tomentose at the beginning of vegetation. Grows on solonchaks and solonetz soils. (photo - Ilya Mikheev)



**Similar species:**

**Artemisia lerchiana Web.** (photo - Yaroslav Golovanov)

Lerh's wormwood is distinguished by a more whitish-silver color and high branched fruit shoots.



**Artemisia lercheana Web.**

**Asteraceae Family**

**Status or value:** Fodder, ethereal.

**Description:** Semi-shrub 16–45 cm high. The entire plant is grayish at first with thick fluffy hairs, later partially glabrous. The bush consists of perennial woody, strongly shortened shoots and short annual leafy ones. Baskets are sessile, collected in a compressed panicle inflorescence. The corolla is yellow or pink. Grows on light chestnut and sandy loam soils, sands, less often on deposits of western and northwestern Kazakhstan. (photo - Denis Mirin, Pavel Evseenkov)



**Flowering and fruiting:**



**Biotope:** 2

**Similar species:**

**Artemisia monogyna Waldst. et Kit.** (photo - Ilya Mikheev)

*Artemisia lercheana* differs from *Artemisia monogyna* by more whitish-silver color and tall branchy shoots bearing fruit.



**Krascheninnikovia ceratoides (L.) Gueldenst**

**Amaranthaceae Family**

**Status or value:** Fodder, fuel.

**Description:** Shrub up to 100 cm in height. Leaves to the base are wedge-shaped or curled, from linear-lanceolate to elliptical and ovate-lanceolate, from above - slightly pubescent to almost glabrous, from below - densely fluffy. The fruit is obovate, about 3 mm long, covered with simple, appressed hairs (see the Terms and the Glossary). Distributed over stony and gravelly steppes, trails, drying up river beds, solonchak terraces, pebbles. Has a wide range of adaptability to various soils. (photo - Igor Evdokimov, Tatyana Sova)

**Similar species:** none

**Flowering and fruiting:**



**Biotope:** 1



**Flowering and fruiting:**



**Biotope:** 1, 3

## *Phragmites australis* Cav.

Poaceae Family

**Status or value:** included in the IUCN Red List with the LC (Least Concern) status - causes least concern. It has fodder and technical value.

**Description:** Perennial grass up to 3 m high, with a powerful rhizome, with long, thick underground or aboveground shoots. Stems are straight, glabrous, smooth. The leaves are gray-green, hard, flat, up to 5 cm wide, rough along the edge. Inflorescence - panicle up to 20-30 cm in length, dense, brown-violet. It is widespread in river mouths, along the shores of lakes, streams, irrigation ditches, rivers, with a close occurrence of groundwater. It tolerates significant salinity of water (salty and bitter-salty) and is found on solonchaks covered with a white veil of salt. It often grows in clean thickets. (photo - Tamara Rib, Marina Skotnikova)

**Similar species:** none

**Flowering and fruiting:**

1	2	3	4	5	6	7	8	9	10	11	12
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**Biotope:** 5, 6, 7



## *Descurainia sophia* (L.) Schur.

Brassicaceae Family

**Status or value:** weedy, poisonous.

**Description:** An annual poisonous plant with a stem height of 10 to 80 cm. It has a rather unpleasant odor. The stem is straight, branched, densely leafy, grayish pubescent. The leaves of the plant are alternate, double or triple pinnate, have a length of 1.5 to 8 cm and a width of 0.8 to 3 cm. At the base are the so-called «ears». Petals are pale yellow, pods are tuberous, slightly curved, glabrous. Grows everywhere. (photo - Tatiana Vinokurova, Gennady Okatov)

**Similar species:** none

**Flowering and fruiting:**

1	2	3	4	5	6	7	8	9	10	11	12
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**Biotope:** 1, 6, 7

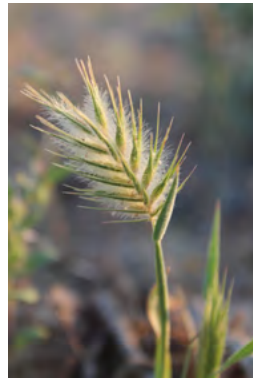


## *Eremopyrum orientale*(L.) Jaub. et Spach

Poaceae Family

**Status or value:** fodder.

**Description:** Annual plant 4 - 30 cm tall. The stem is glabrous and smooth, pubescent only under the ear. The base of the lower leaves is rough, pubescent, the upper leaves are glabrous, smooth, slightly swollen. Leaves are linear, flat, 3-4 mm wide, scabrous above and below, pubescent. The spike is elliptical or oblong-ovate, 1.5 - 5.5 cm long, 6.9 - 2.5 cm wide, green or slightly violet colored; Spikelet 9-17 mm long., 3 - 5-flowered. (see the Terms for leaves forms). It grows in dry steppes and deserts, on dry slopes of the lower mountain belt of all Kazakhstan. (photo - Yulai Tabuldin, Fedor Shakula)



**Similar species:**

*Eremopyrum triticeum* (Gaertn.) Nevski. (photo - Leonid Nepomenko)

*Eremopyrum orientale* differs from *Eremopyrum triticeum* by the presence of dense pubescence of the lower floral scales.



**Flowering and fruiting:**



**Biotope:** 1



## *Poa bulbosa* L.

Poaceae Family

**Status or value:** fodder.

**Description:** Perennial herb 10-50 cm high, forming a loose turf. Stems are smooth, thin. Leaves are narrow, threadlike, grayish-green. Stems at the base of the shoots are widened, thickened, forming bulbous thickenings (see Glossary). The inflorescence is a dense, compressed panicle. The panicle is oblong (see diagrams) up to 8 cm long. It occurs on clay and sandy loamy soils of plains and foothills of all Kazakhstan. (photo - Tamara Rib, Natalya Beshko)

**Similar species:** none

**Flowering and fruiting:**



**Biotope:** 1, 6

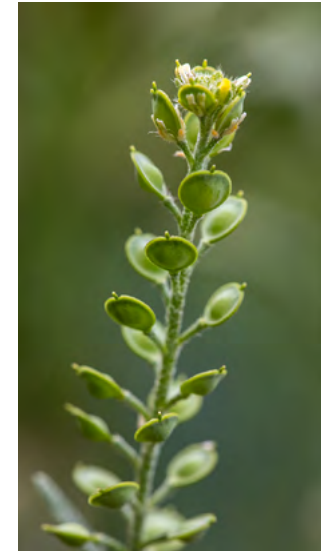


## *Alyssum turkestanicum* Regel & Schmalh

Brassicaceae Family

**Status or value:** -

**Description:** Annual. Stem 10-20 cm high, branched from the base, gray with stellate hairs. Leaves are linear-oblong, narrowed towards the base. The flowers are collected in a raceme that elongates as the fruit ripens (see the Terms) Petals are linear-oblong, notched, less often obtuse, pale yellow, almost white when flowering, 2.5-3 mm long. It grows on solonchic and sandy places of steppes and deserts, rocky and gravelly slopes of the entire plain and low-mountainous of Kazakhstan. (photo - Pavel Gorbunov, Ilya Mikheev)





**Similar species:**

**Lepidium ruderale L.** (photo - Sergey Glotov)

*Lepidium ruderale* L. differs from *Alyssum turkestanicum* by its densely branched stem. *Alyssum turkestanicum* has a small elongated nose at the end of the seeds.



**Clypeola jonthlaspi L.**

**Brassicaceae Family**

**Status or value:** Listed in the Red Data Book of the Republic of Kazakhstan.

**Description:** Plant 4-27 cm tall with a simple or branched stem. Leaves are entire, spatulate. The brushes are thick. Sepals 0.15 cm long, petals about 0.2 cm long. Pods (fruits) are almost round, slightly notched at the top. On the project area, the species was recorded in the area of the Bolshaya Prorva channel. (photo - Tulkin Tillaev, Roland Tsandekidis)

**Similar species:** none.

**Flowering and fruiting:**

1	2	3	4	5	6	7	8	9	10	11	12
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**Biotope:** 1



**Flowering and fruiting:**

1	2	3	4	5	6	7	8	9	10	11	12
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**Biotope:** 1

## *Tauscheria lasiocarpa* Fisch.

Brassicaceae Family

**Status or value:** -

**Description:** Annual, 15-30 cm tall. Flower petals are yellow, pods (fruits) are scaphoid, non-opening, 1-seeded. It grows on solonchik and clayey steppes, thickets of bushes and stony slopes of the mountains of all Kazakhstan. The species is extremely rare on the project area. (photo - Olga Vakhmistrova, Yury Pirogov)



**Similar species:** none.

**Flowering and fruiting:**



**Biotope:** 1



## *Goldbachia pendula* Botsch.

Brassicaceae Family

**Status or value:** -

**Description:** Herbaceous annual, 10-35 cm tall. Fruit type is dry pod or bean. On clayey and clayey-rubble slopes of low and middle mountains of western, southeastern and southern Kazakhstan. The species is extremely rare on the project area. (photo - Maxim Zaitsev, Leonid Nepomenko)

**Similar species:** none

**Flowering and fruiting:**



**Biotope:** 1



## *Gypsophila krascheninnikovii* Schischk.

*Caryophyllaceae* Family

**Status or value:** endemic of Western Kazakhstan and the Aral Sea region.

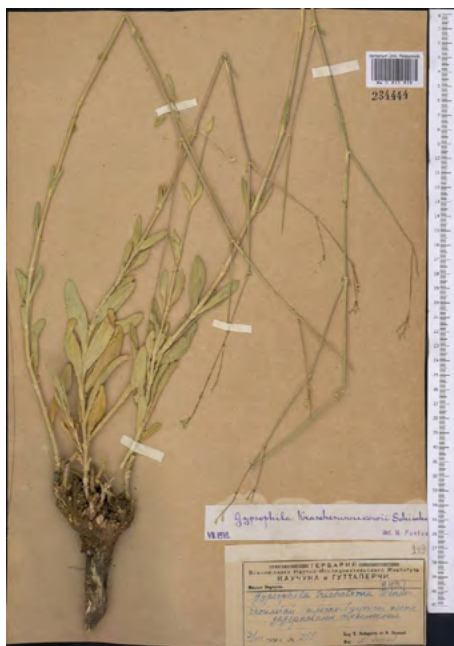
**Description:** Perennial, 60-100 cm tall. Stems are solitary or 2-3 in number, erect, partly ascending only at the base, not rooting. The flowers are numerous, with filmy bracts, the petals are equally colored. Flowers on filiform, long, 5-8 mm long pedicels, in a loose inflorescence. It grows on sandy and solonetz steppes, river banks and rocky slopes of western Kazakhstan and the Aral Sea region. (photo - Lomonosov Moscow State University, Living Systems Depository, Vladimir Epiktetov)

**Similar species:** none

**Flowering and fruiting:**

1	2	3	4	5	6	7	8	9	10	11	12
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**Biotope:** 1



## *Atraphaxis decipiens* Jaub. & Spach

*Polygonaceae* Family

**Status or value:** endemic.

**Description:** Shrub 5-25 cm tall, with thick stems and twisted branches. The bark is gray, brownish-gray, longitudinally cracked. The branches are densely leafy. Leaves glabrous (not pubescent), lanceolate or linear (see the Terms), 5-9 mm in length, 0.5-1.5 mm wide. The fruit is an elongated triangular nutlet (see the Terms), smooth, shiny, with dark brown spots. It grows on the steppe, stony and gravelly slopes of the foothills and plains of almost all Kazakhstan, except for the southern one. It is very rare on the territory of Partnership. (photo - Mikhail Knyazev, Pavel Golyakov)



**Similar species:**

***Atraphaxis replicata* Lam.** (photo - Ekaterina Ontikova)

*Atraphaxis decipiens* is distinguished by its smaller size - 5-25 cm in height, compared to 40-80 cm of *Atraphaxis replicata*.



***Tragopogon dubianskyi* Krasch.  
& S.A. Nikitin**

*Asteraceae* Family

**Status or value:** endemic, fodder, food.

**Description:** Biennial, 40-150 cm tall. The leaves are lanceolate, wider at the base. Achenes are smooth, plants are bare. Baskets are numerous, on short, often curved peduncles, clustered in a panicle (see the Glossary). The flowers are yellow, rarely violate or purple. It grows on shallow hilly, sparsely overgrown sands and sandy steppes of plain steppe Kazakhstan. It is very rare on the project area. (photo - Pavel Gorbunov)



**Flowering and fruiting:**



**Biotope:** 1, 6

**Similar species:**

**Tragopogon tanaiticus** Artemczuk. (photo - Alexander Bronskov)

*Tragopogon dubianskyi* is 40-150 cm tall, while *Tragopogon tanaiticus* - 15-75 cm. Seeds of *Tragopogon dubianskyi* are smooth, thick, mostly without a nose, while at *Tragopogon tanaiticus* - thin, with a spout.



**Flowering and fruiting:**



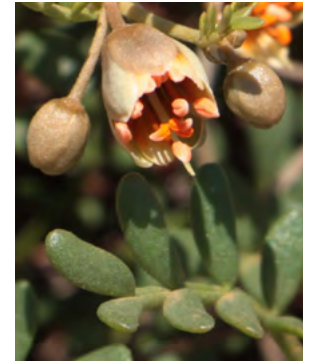
**Biotope:** 1, 6, 7

**Zygophyllum pinnatum** Cham.

**Zygophyllaceae** Family

**Status or value:** -

**Description:** 5-20 cm tall. The plant is rough, leaves are 2-3 paired, narrow - 2-5 mm wide. The fruits are broad-winged capsules. Flowers are 7-9 mm long, white. Grows on solonetz, clayey soils and stony hillsides of almost all of Kazakhstan. It is very rare on the project area. (photo - Mikhail Knyazev)



**Similar species:**

**Zygophyllum fabago L.** (photo - Lina Waldschmidt)

They differ by leaves: in *Zygophyllum pinnatum* - 2-4 paired oblong, in *Zygophyllum fabago* - one-paired



**Flowering and fruiting:**



**Biotope:** 1, 6

***Achillea micrantha Willd.***

**Asteraceae Family**

**Status or value:** ethereal.

**Description:** Perennial, 20-50 cm tall. The plant is grayish, tomentose. Medium stem leaves are petiolate. Leaves linear-lanceolate or oblong, 2-10 cm long, pinnately dissected (see the Glossary and the Terms). Achenes truncated at the apex. Grows on sands and sandy soils, less often steppe pastures and solonchic meadows of the steppes and deserts of northern and western Kazakhstan. It is very rare on the project area. (photo - Mikhail Knyazev, Tatyana Nikulina)

**Similar species:** нет

**Flowering and fruiting:**



**Biotope:** 1, 6, 7



## *Haloxylon aphyllum* (Minkw.) Iljin

*Amaranthaceae* Family

**Status or value:** fuel, feed, technical.

**Description:** A tree up to 8 meters high. The crown is colored rather dark green. This color persists in spring and summer. By autumn, the crown becomes orange-brown. Has small nondescript flowers. They do not stand out in any way on the plant. However, the fruit with the membranous wings is very visible. From a distance they look like flowers. Leaves, not at all developed or represented only by a tubercle. Grows on solonchaks, takyrs, among the sands of desert Kazakhstan. It is rare on the project area, represented by two groves - on the north-western edge of the Partnership and in the Fishery area (along the Berkut Zholy road). (photo - Ilya Smelyansky, Alim Gaziev)



**Similar species:**

***Haloxylon persicum* Bge.** (photo - Bazaar Dovletov)

*Haloxylon persicum* differs from *Haloxylon aphyllum* by smaller size, its bark has a whitish-ash color, while darker for *Haloxylon aphyllum*.



**Flowering and fruiting:**



**Biotope:** 1, 6

## *Tulipa biflora* Pall.

Liliaceae Family

**Status or value:** Listed in the Red Data Book of the Republic of Kazakhstan.

**Description:** Perennial 10-20 cm tall. Bulb ovoid, 1-1.5 cm wide, with grayish-brown coats, cobweb-woolly inside. Stem glabrous, brownish-green. Leaves, two in number, sickle-bent, glabrous, smooth, linear, slightly bluish, with a dull purple edging, the lower one slightly exceeds the flower. The bud is erect, there are one or two flowers (sometimes up to six), the flowers are white, yellow at the base, 13-25 mm long, the outer petals are lanceolate, dirty purple on the outside, the inner ones are oblong or oblong-ovate, pointed, with a clear the green median vein is one and a half times narrower than the inner ones. It grows on the steppes, depressions, solonetz of northern and western Kazakhstan. (photo - Evgeny Komarov, Pavel Gorbunov)

**Similar species:** none

**Flowering and fruiting:**



**Biotope:** 1

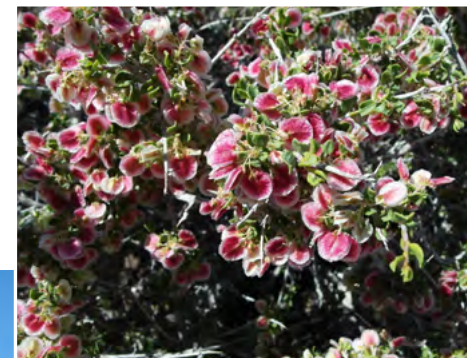


## *Atraphaxis replicata* Lam.

Polygonaceae Family

**Status or value:** -

**Description:** Widely branched low bush 50-80 cm tall. Branches are thin, straight, with yellowish or reddish brown bark, covered with whitish cracking skin, elongated, directed upwards, usually without thorns. Leaves are short-petiolate, small, 4-8 mm long, orbicular, oval, elliptical. Inflorescence is a lateral raceme. Several brushes, usually 2-6, are collected in bunches in the leaf axils. The flowers are bright pink with white edges. The fruit is an ovate nutlet, narrowed towards the apex, somewhat flattened, light brown. Grows on gravelly and clayey slopes of plain and mountainous Kazakhstan. (photo - Vladimir Kolbintsev, Igor Evdokimov)





**Similar species:**

***Atraphaxis decipiens* Jaub. & Spach.** (photo - Pavel Golyakov)

*Atraphaxis decipiens* is distinguished by its smaller size - 5-25 cm in height, while height of *Atraphaxis replicata* - 40-80 cm.



***Nitraria schoberi* L.**

*Nitrariaceae* Family

**Status or value:** included in the IUCN Red List with the LC (Least Concern) status - causes least concern. Has food, decorative value.

**Description:** Shrub up to 1.5 (rarely 2) m in height and up to 6 m in diameter. Shoots are strong, prickly, branched, covered with whitish bark. Leaves are alternate, oblong-spatulate. Flowers are collected in inflorescences (curls). The perianth is represented by 5 fleshy sepals, 5 yellowish-white petals, 10-15 stamens and a single pistil. The fruit is a spherical-ovoid single-seeded drupe. At first, the fruit is red, when ripe it becomes almost black. It grows on clayey solonchaks in valleys and foothills of almost all of Kazakhstan. (photo - Pavel Gorbunov, Leonid Nepomenko)



**Flowering and fruiting:**



**Biotope:** 1, 6

**Similar species:**

**Nitraria sibirica Pall.** (photo - Sergey Kazanovsky)

*Nitraria schoberi* differs by slightly large leaves, the fruit is an ovoid drupe with reddish juice, and *Nitraria sibirica* has a globular drupe with dark blue juice.



***Kochia prostrata (L.) Schrad.***

*Amaranthaceae Family*

**Status or value:** fodder.

**Description:** Semi-shrub up to 65 cm. in height. Stems are numerous, reddish, branched. The leaves are flat, filiform-linear, sharp, pubescent (see the Terms and the Glossary). Seeds are round-oval or almost round, depressed on both sides, brown, glabrous, smooth. Widespread on stony and gravelly slopes and trails of hills and mountains, solonetz and solonchaks, solonetzic steppes and sands. (Photo: Alexander Fateryga, Tulkin Tillaev)

**Similar species:** none.

**Flowering and fruiting:**



**Biotope:** 1



**Flowering and fruiting:**



**Biotope:** 1

## *Salicornia europaea* L.

*Amaranthaceae* Family

**Status or value:** fodder, insecticidal.

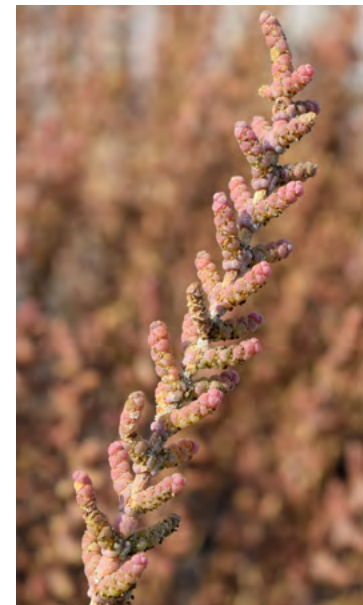
**Description:** Annual, 5-30 cm tall, with a juicy branched stem, leaves are almost reduced, resembling scales in shape. The young plant is colored emerald green, with the arrival of cold weather it acquires crimson tones. Like a bamboo, the stem consists of many knees (segments), at the base of which barely noticeable leaves develop in opposite order. The twigs of the stem often twist, especially often at its base. The upper segments of the stem are shorter and have depressions (sinuses), from which flowers develop in the warm season. The inflorescence is spiky. The length of the inflorescence is about 10 cm. It grows on wet solonchaks, shors, the shores of salt lakes and rivers throughout the plain Kazakhstan. (photo - Vladimir Semashko, Ivan Gerasimov)



**Similar species:**

***Halocnemum strobilaceum* (Pall.).**  
(photo - Tulkin Tillaev)

Sarsazan (*Halocnemum strobilaceum*) has a more creeping crown, the color of the stems is paler, the branches are much shorter than that of the *Salicornia europaea*.



**Flowering and fruiting:**

1	2	3	4	5	6	7	8	9	10	11	12
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**Biotope:** 3

## *Tamarix laxa* Willd.

*Tamaricaceae* Family

**Status or value:** decorative.

**Description:** Shrub 1-2 (3) m tall. The bark of old branches is gray. Young branches are short, reddish-brown, gray-cherry or gray, fragile. The flowers are light pink, collected in racemes, 1-4 cm long, the racemes are sparse. The fruit is a narrow capsule 3-5 mm long, about 1 mm wide. It grows on solonchaks, salonetz, sands, on the outskirts of takyrs, in floodplains and on river terraces, along the shores of lakes. (photo - Vladimir Epiktetov, Andrey Lyubchenko)



**Similar species:**

**Tamarix ramosissima**  
**Ledeb.** (photo - Grigory Prokopov, Vasily Gelyuta)

*Tamarix ramosissima* differs from *Tamarix laxa* by more elongated, very dense brushes, with densely spaced flowers. In *Tamarix laxa*, the pedicels (the stalk bearing the flower) are rather long.



**Flowering and fruiting:**



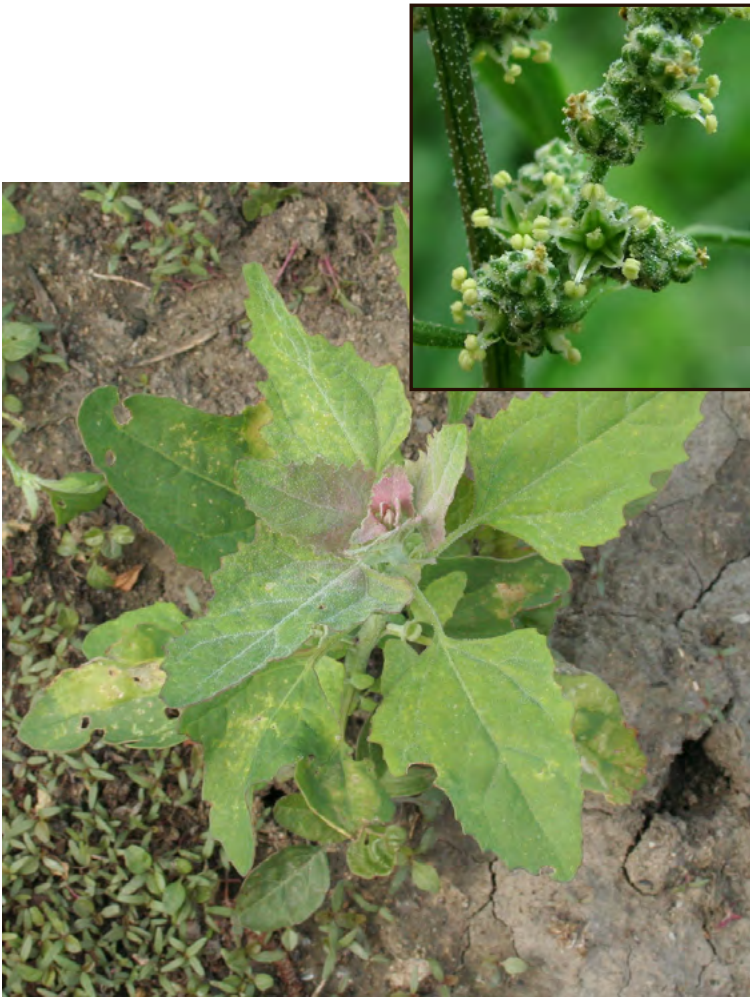
**Biotope:** 6

## *Chenopodium album* L.

*Amaranthaceae* Family

**Status or value:** weedy.

**Description:** Annual herb, 15-100 cm tall, with simple or branching stems. Leaves of various shapes: more often rhombic (similar to a rhombus), as well as linear-lanceolate. The leaves are covered with a whitish powdery bloom, the bloom disappears with time. (photo - Tamara Rib, Gennady Okatov)



**Similar species:**

*Atriplex tatarica* L. (photo - Maxim Zaitsev)

Leaves of *Chenopodium album* are larger, usually light green from a mealy bloom, which *Atriplex tatarica* doesn't have.



**Flowering and fruiting:**



**Biotope:** 6

SECTION

3

# FAUNA

### 3.1. AMPHIBIANS AND REPTILES

In total, 1 species of amphibians and 12 species of reptiles are registered on the TCO Partnership territory. Most of them are widespread in the region.

The occurrence of amphibians and reptiles is explained by their high dependence on weather conditions and ambient temperature, which affect their activity, and their secretive lifestyle.

Reptiles and amphibians are able to live in areas adjacent to production facilities, in case of a disturbance factor's absence.

#### LEGEND



*Hibernation*



*Activity period*

### *Green Toad*

*Bufo viridis*

**Field marks:** About 7-9 cm in size. The skin is lumpy. Color: large dark green spots, framed by a narrow black border, on a light gray-olive background.

**Status:** One of the widespread species.

**Biology:** Inhabits a wide range of biotopes: forest-steppes, steppes, semi-deserts and deserts. Occupies the driest habitats. Out of the breeding season, it has a terrestrial lifestyle and is often found in niches of human buildings. Reproduction takes place in water. Active at night and at dusk.

**Biotopes:** 5, 7



## Steppe Agama

*Trapelus sanguinolentus*

**Field marks:** Body length is about 10-15 cm, and the tail is 1.5-2 times longer than the body. The general tone of the color is gray-brown. With an increase in temperature, as well as in an excited state, the color of adult agamas changes and becomes very bright. In males, the throat, belly, sides and limbs become dark blue, blue spots appear on the back, and the tail becomes bright yellow or orange-yellow in color. Females become bluish or greenish yellow, dark spots on the back become orange or rusty orange. Juveniles are light gray.

**Status:** Widespread species in the southern half of the country.

**Biology:** Inhabits sand, clay and stone deserts and semi-deserts, preferring places with shrub or semi-woody vegetation, often in the immediate vicinity of water, near settlements and along roadsides. It uses holes of rodents, voids and cracks in the ground, niches in human buildings as shelters. Adults control individual territories and stay in constant small areas, beyond which they very rarely go.

**Biotopes:** 1, 2, 5, 6, 7

1	2	3	4	5	6	7	8	9	10	11	12
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## Steppe Ribbon Snake (Steppe Ribbon Racer)

*Psammophis lineolatus*

**Field marks:** Body length reaches 90 cm. Coloring of the upper part of the body is olive-gray, sandy or brownish-gray. 4 dark longitudinal stripes with black edges run along the body, sometimes they are absent or are only narrow or dotted stripes. The end of the muzzle is rounded, the head is narrow, the pupil is large and round.

**Status:** Common species in the southern half of the country.

**Biology:** Inhabitant of open arid areas; most often found in deserts, where it inhabits fixed and semi-fixed sands, less often in clay sagebrush and sagebrush-saltwort semidesert. Active during the day, hiding at night in rodent holes and bushes. A fairly mobile snake. The bite is harmless to humans.

**Biotopes:** 1, 2, 6

1	2	3	4	5	6	7	8	9	10	11	12
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## *Dione Snake (Dione's Rat Snake)*

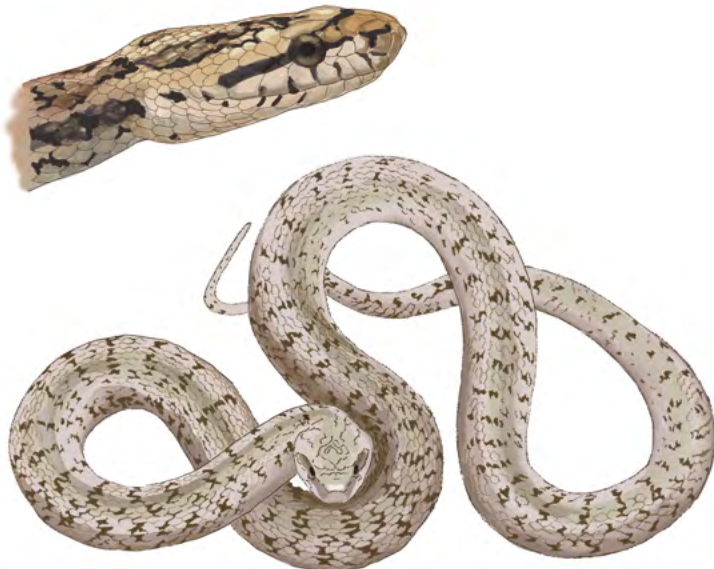
*Elaphe dione*

**Field marks:** Reaches up to 1 m in length. The general background of the back is grayish-brown, sometimes with a brown tint, with four brownish longitudinal stripes and blackish spots. In juveniles, the color is brownish-olive or reddish-brownish-olive with narrow dark brown transverse stripes in the front part of the body. The head is wide, the pupil is round.

**Status:** Common species .

**Biology:** Ecologically very plastic species. Inhabits various landscape zones: forests, steppes, on solonchaks, stony and clay semi-deserts. Often settles near humans. Active during the day. It uses holes of rodents, cavities under stones, niches of human buildings as shelters. The bite is harmless to humans.

**Biotopes:** 1, 2, 5, 6, 7



## *Eastern Steppe Viper (Orsini's Viper)*

*Vipera renardi*

**Field marks:** Body length up to 55 cm. The upper part of the body is gray-brown or light gray with a dark zigzag stripe along the ridge, sometimes the stripe is broken into separate spots. The head is comparatively elongated, the muzzle is slightly pointed. The pupil is vertical.

**Status:** Rare species. Listed in the IUCN Red List as Vulnerable (VU).

**Biology:** Inhabits plain and mountain sagebrush steppes, clay ravines, solonchak semi-deserts and fixed sands. Active during the day. It uses holes of rodents, cavities under stones, niches of human buildings as shelters. Poisonous, the bite is dangerous to humans.

**Biotopes:** 2, 5



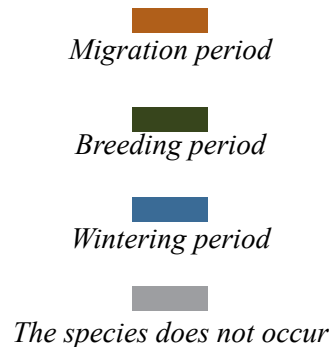
### 3.2. BIRDS

On the project area, birds are represented by the largest number of species (over 200). The species and quantitative composition vary depending on the season of the year. Most species can be registered during the periods of seasonal migrations (March-May, August-October). The nesting period in the region lasts from March to mid-July.

The most populated, both in terms of number of species and in quantity, are artificial evaporation ponds, especially the territory of the sewage treatment plant (WWTP). Evaporation ponds are used not only by aquatic and semi-aquatic species, but also by other species as a source of drinking water. Also, a considerable number of birds (gulls, predator birds) visit the household waste landfill, where they feed.

Anthropogenic landscapes attract synanthropic species typical for the region. These species adapt to live and nest next to humans, using buildings and other constructed objects. In the working sites of the project area, birds nest on metal frames and modules, power transmission line supports, inside covered warehouses and premises, in niches of various types of objects and stored materials, on the ground, in slopes of trenches and quarries.

#### LEGEND



### *White-headed Duck* *Oxyura leucocephala*

**Field marks:** Males are well distinguishable from females. The head of the male is white, with a black crown and a bright blue beak (in spring and summer), the neck is black, and the body is brown. The head of the female, unlike the male, is dark brown, with wide white ear patch. The tail is often kept upright.

**Status:** Rare breeding migratory duck. Listed in the Red Data Book of the Republic of Kazakhstan (I category) and in the IUCN Red List as endangered species (EN).

**Biology:** Inhabits fresh or slightly salty deep reed lakes and open water bodies in plains. Arranges nests in reed thickets. Probably nests in evaporation ponds of WWTP, where it is regularly observed from spring to autumn.

**Biotopes:** 5



## Steppe Eagle

*Aquila nipalensis*

**Field marks:** Large predatory bird. Adult birds have dark brown plumage. Juveniles up to two years old have light wing bars, which are visible both on folded wings and in soaring birds.

**Status:** Breeding migratory species. Listed in the Red Data Book of the Republic of Kazakhstan (V category) and in the IUCN Red List as endangered species (EN).

**Biology:** Inhabits dry steppes, semi-deserts and the northern part of the desert zone with outcrops of rocks, low mountains and foothills of high mountain ranges, in places populated by rodents. Often found in the region during seasonal migrations.

**Biotopes:** 5, 7



## White-tailed Eagle

*Haliaeetus albicilla*

**Field marks:** Large predatory bird. Adult birds are light brown with a pure white tail and a bright massive yellow beak. Juveniles are dark-brown, with light streaks on the body and wings, the beak is dark. Long and wide wings are characteristic.

**Status:** Rare breeding migratory species. Listed in the Red Data Book of the Republic of Kazakhstan (II category).

**Biology:** Lives in floodplain forests, forest islets of the steppe zone, not far from lakes rich in fish with thickets of reed. During seasonal migrations, and especially during autumn migration, eagles are found in places rich in food (on lakes with ducks and other birds).

**Biotopes:** 5, 7



## *Saker Falcon* *Falco cherrug*

**Field marks:** Large falcon (larger than a crow). The main color is rufous-gray, lighter below, with longitudinal dark streaks.

**Status:** Rare breeding migratory species. Listed in the Red Data Book of the Republic of Kazakhstan (I category) and in the IUCN Red List as endangered species (EN).

**Biology:** Inhabits steppes and deserts, in areas with individual trees or groves, power lines, geodetic towers; and also, in chinks, near river cliffs, in rocky outcrops and gorges in the mountains. Found in the region during seasonal migrations.

**Biotopes:** 7

1	2	3	4	5	6	7	8	9	10	11	12
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## *Common Kestrel* *Falco tinnunculus*

**Field marks:** Small falcon (about the size of a dove). The color is dominated by a light rufous shade. Male's head is gray, upper body is rufous, lower body is light buffy with longitudinal dark spots. Female's upper body and head are dark-rufous, lower body also has longitudinal spots. Juveniles look like females. Wide, rounded wings and a long tail are visible marks in flight.

**Status:** Common breeding migratory species.

**Biology:** Lives in forest-steppes, steppes and deserts with groves, floodplain forests, forest belts, clay and rocky cliffs near open spaces. Breeds in separate pairs or in small groups of 5-10 pairs. Use old nests of crows, magpies, rooks.

**Biotopes:** 7

1	2	3	4	5	6	7	8	9	10	11	12
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***Egyptian Vulture***  
*Neophron percnopterus*

**Field marks:** Medium-sized predatory bird. All plumage is white, flight feathers are black. It has large wedge-shaped tail and a bare «face» covered with yellow skin.

**Status:** Rare breeding migratory species. Listed in the Red Data Book of the Republic of Kazakhstan (III category) and in the IUCN Red Lista as endangered species (EN).

**Biology:** Inhabits desert uplifts, chinks and steep banks of desert rivers.

**Biotopes:** 7

1	2	3	4	5	6	7	8	9	10	11	12
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***Kentish Plover***  
*Charadrius alexandrinus*



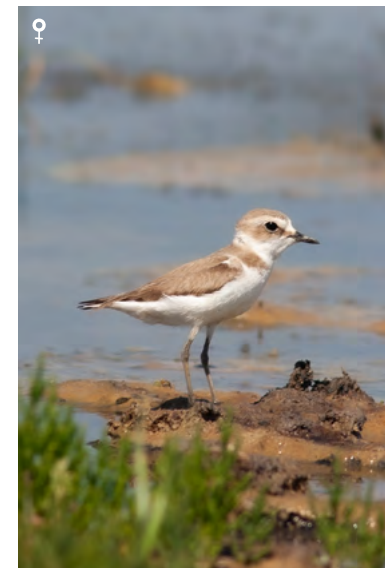
**Field marks:** Small sandpiper, slightly larger than a sparrow. The upper body is sandy, the lower body is white. In breeding plumage, the male, in contrast to the female, has a reddish crown and a black forehead. The female looks dimmer.

**Status:** Breeding migratory species.

**Biology:** Usually inhabits the sandy and muddy shores of salt lakes, but sometimes also on solonchaks near fresh water. Nests are arranged on sand or solonchaks. In the project area, it nests in evaporation ponds and in work areas.

**Biotopes:** 3, 4, 5, 7

1	2	3	4	5	6	7	8	9	10	11	12
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## Northern Lapwing

*Vanellus vanellus*

**Field marks:** Sandpiper of medium size (as a pigeon). The upper body is brilliant green, with purple, blue and violet tints, it seems black from a distance, the belly is pure white. Long thin crest on the back of the head, the legs are red-brown. Differs from all other waders by its wide, rounded black and white wings in flight.

**Status:** Breeding migratory species. Listed as near threatened (NT) in the IUCN Red List.

**Biology:** Inhabits wet meadows of river valleys, near lakes, in swamps on plains. Rarely lives on deposits and solonchaks near water. Found near evaporation ponds during seasonal migrations in the region.

**Biotopes:** 5



## Sociable Lapwing

*Vanellus gregarius*

**Field marks:** Sandpiper of medium size (as a pigeon). The general color tone is brownish-gray. In spring, males differ from females - in contrast to them, they have a black cap, a black eye line and a black belly. In winter, both have similar and dimmer look, thus it's difficult to distinguish. In flight it differs from Northern Lapwing by narrower black and white wings.

**Status:** Rare breeding migratory species. Listed in the Red Data Book of the Republic of Kazakhstan (I category) and in the IUCN Red List as critically endangered (CR).

**Biology:** Inhabits dry steppes and semi-deserts with solonchak spots and sparse vegetation, usually near water. Previously recorded within the project area during seasonal migrations.

**Biotopes:** 2, 5



## ***Pallas's Gull*** *Larus ichthyaetus*

**Field marks:** A very large gull. In breeding plumage, it is unmistakably identified by its large size and black head. Beak and legs are yellow. The upper body is light silver, the underside is white.

**Status:** Rare breeding migratory species. Listed in the Red Data Book of the Republic of Kazakhstan (II category).

**Biology:** Breeds on the coast of the Caspian Sea, on large salt and fresh lakes and reservoirs, preferring fish reservoirs with small islands. During migration it also occurs on the banks of rivers and small lakes, and on evaporation ponds of the territory.

**Biotopes:** 5



## ***Black-headed Gull*** *Larus ridibundus*

**Field marks:** A small gull, about the size of a crow. In the breeding plumage, the head is dark brown, appearing black from afar. The beak and legs are dark red. The top of the body is light gray, the bottom is white.

**Status:** Breeding migratory species.

**Biology:** Inhabits the shores of fresh and salt lakes, ponds and rivers with abundant emergent vegetation. It also settles on the islands of lakes and rivers. From spring to late autumn, it occurs in evaporation ponds and landfills.

**Biotopes:** 5



**Caspian Gull**  
*Larus cachinnans*

**Land marks:** Large seagull. Adult birds have a light silver upper body, white lower body, black wing tips, yellow beak and legs. Juveniles are gray-brown.

**Status:** Breeding migratory species.

**Biology:** Inhabits fresh and salt lakes, river mouths, areas along the coast of the Caspian Sea. From spring to autumn, it is found in evaporation ponds and on a household waste landfill.

**Biotopes:** 5



**White Wagtail**  
*Motacilla alba*

**Field marks:** A slender, mobile bird, the size of a sparrow, with an elongated tail, which it regularly wiggles up and down. The plumage combines black, white and gray colors.

**Status:** Common breeding migratory species.

**Biology:** Inhabits open areas, often near water, as well as flooded meadows near forest spots and human settlements in the steppe. Nests in cliffs, on the ground under hummocks or under tree roots, in various tree cavities at a height of 1-4 meters from the ground, under bridges and in cavities of various structures.

**Biotopes:** 7





## ***Blue-cheeked Bee-eater***

*Merops persicus*

**Field marks:** Starling-sized. Males and females have the same color. The overall color is bright green. Black eye line, blue cheeks, yellow chin, throat has a brown spot.

**Status:** Migratory species breeding in the southern half of Kazakhstan.

**Biology:** Inhabits flat and hilly sandy deserts, often close to water bodies (lakes, river valleys, irrigation canals). Breeds in colonies in burrows that digs in cliffs or in dense sand.

**Biotopes:** 1, 5, 6



## ***European Bee-eater***

*Merops apiaster*

**Field marks:** Starling-sized. Males and females are similar in color. The plumage is bright and variegated with a combination of chestnut, golden, yellow, green and blue colors.

**Status:** Breeding migratory species.

**Biology:** Lives in open plain or hilly landscapes with earthen or clay cliffs; along river valleys and lake shores, especially near villages and towns. Breeds in colonies in burrows that digs in precipices.

**Biotopes:** 5, 6



**Red-backed Shrike**  
*Lanius collurio*



**Field marks:** Larger than a sparrow. Male's back is reddish-brown, top of the head is gray, the bottom is white and it has a black mask. The upper body of the female is grayish-brown, the lower is brownish-white with a scaly pattern.

**Status:** Breeding migratory species.

**Biology:** Inhabits both natural and artificial (forest belts, gardens, etc.) shrub and woody areas on plains, not far from water bodies. During migration occurs in reed beds. It nests at a height of up to 2 meters from the ground in bushes or short trees, but in dry steppes and semi-deserts it can nest on the ground or in wormwood bushes.

**Biotopes:** 7

1	2	3	4	5	6	7	8	9	10	11	12
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**Steppe Grey Shrike**  
*Lanius pallidirostris*

**Field marks:** Starling size. The top of the body is gray, the bottom is white, a black «mask» passes through the eyes. The wings are black and white in flight.

**Status:** Resident, having nomadic behavior within the nesting area or slightly to the south. Inhabits the southern half of the country.

**Biology:** Inhabits saxaul and turang forests, shrub thickets in deserts, and even in places completely devoid of both arboreal and shrub vegetation. In these places, the Steppe Grey Shrike builds nests on artificial objects such as geodetic pointers, telegraph poles, power transmission line poles, etc.

**Biotopes:** 1, 6

1	2	3	4	5	6	7	8	9	10	11	12
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**Barn Swallow**  
*Hirundo rustica*

**Field marks:** A small bird with an elongated body has a long forked tail and long pointed wings. The upper part of adults' body is black with a bluish metallic sheen, forehead, chin and throat are rufous-red. White underneath. The flight is fast, impetuous.

**Status:** Breeding migratory species.

**Biology:** Nests usually in settlements, near water bodies. Nest is composed from lumps of clay under the roofs of various human structures, under bridges, on walls and other suitable vertical surfaces. During the migration season, it occurs in flocks.

**Biotopes:** 5, 7

1	2	3	4	5	6	7	8	9	10	11	12
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**Sand Martin**  
*Riparia riparia*

**Field marks:** Smaller than a sparrow. Upper body is grayish-brown, lower body - white. The tail is short. The flight is fast, impetuous.

**Status:** Breeding migratory species.

**Biology:** Inhabits the banks of rivers, ponds, lakes, dry beds, sand pits, trenches, sometimes far from water. Nest in burrows, in colonies of several dozen pairs. During the migration season, it occurs in flocks.

**Biotopes:** 5, 6, 7

1	2	3	4	5	6	7	8	9	10	11	12
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**Lesser Short-toed Lark**  
*Calandrella rufescens*



**Field marks:** The size of a sparrow. The general tone of the plumage is gray-brown.

**Status:** Breeding migratory species.

**Biology:** Inhabits solonchak areas of sand deserts, sands with saxaul thickets, sagebrush deserts and dry steppes. Breeds in separate pairs, not far from each other. Nest is built on the ground, in a depression hidden by grass.

**Biotopes:** 1, 2, 3



**Calandra Lark**  
*Melanocorypha calandra*



**Field marks:** Large lark, about the size of a starling. The general tone of the plumage is gray-brown. Black spots on the sides of the neck. In flight, a white edging of dark wings is visible.

**Status:** Breeding migratory species.

**Biology:** Inhabits feather grass-sagebrush, sagebrush steppes, dry and flooded meadows. The nest is located in a depression on the ground under a bush or grass.

**Biotopes:** 1, 2, 3



**Pied Wheatear**  
*Oenanthe pleschanka*

**Field marks:** A small bird, about the size of a sparrow. Male has contrasting plumage in spring and summer, with a white top of the head and black back and wings. Female is brown.

**Status:** Breeding migratory species.

**Biology:** Found in open habitats. On the plains it selects areas with cliffs, ravines, steep banks, buildings or ruins, railway embankments. Nests are arranged in a shelter - among stones, in crevices, holes or other depressions. Sometimes it uses niches of anthropogenic origin.

**Biotopes:** 6, 7

1	2	3	4	5	6	7	8	9	10	11	12
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**Desert Wheatear**  
*Oenanthe deserti*

**Field marks:** The size of a sparrow. Males are well distinguishable from females. In males, the top of the head, back and bottom of the body are buffy-reddish. The cheeks, throat and wings are black. In the plumage of females, the black color is replaced by brown, the top and bottom of the body are buffy-gray.

**Status:** Breeding migratory species in the southern half of Kazakhstan.

**Biology:** Inhabits sandy deserts with sparse vegetation, less often solonchaks and rocky deserts. Nests in uninhabited holes of rodents, between stones, under wormwood bushes, stone slabs or in clay faults at a height of 1-3 m from the ground. Also uses niches in human structures.

**Biotopes:** 1, 2, 6, 7

1	2	3	4	5	6	7	8	9	10	11	12
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**House Sparrow**  
*Passer domesticus*

**Field marks:** In males, the top of the head and cheeks are gray, the throat and chest are black, the top of the body is brown-chestnut, the bottom is light gray. The plumage of females is mostly monochromatic brown-buffy.

**Status:** Common resident species.

**Biology:** Settles in settlements, near individual houses, etc. Breeds in separate pairs, not far from each other, or in loose colonies. Nests are built in various cavities of human structures.

**Biotopes:** 7

1	2	3	4	5	6	7	8	9	10	11	12
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**Desert Finch**  
*Rhodospiza obsoleta*

**Field marks:** The size of a sparrow. The plumage is dominated by pale brownish-sandy tones. Black and pink feathers are visible in the wings. The beak is black. Females are lighter than males.

**Status:** Common breeding migratory species.

**Biology:** Inhabits saxaul forests with open areas (solonchaks, meadows), oases, forest belts, gardens, groves, as well as villages and cities, preferring places near water. The nest is located on a tree or bush, as well as in suitable places on human structures, at a height of 1-4 meters above the ground.

**Biotopes:** 7

1	2	3	4	5	6	7	8	9	10	11	12
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### 3.3. MAMMALS

The species composition of mammals in the TCO Partnership territory has a pronounced desert character and is represented by 34 species. Most of them are common resident species of the corresponding biotopes.

In areas where construction and manufacturing activities are active, mammals - with the exception of rodents - are very rare. They mainly inhabit natural biotopes in the surrounding areas.

#### LEGEND



*Hibernation*



*Activity period*

### *Long-eared Hedgehog*

*Hemiechinus auritus*

**Field marks:** Body length 10-20 cm. Top covered with needles of light straw color. Has large, long ears.

**Status:** Common species in the southern half of the country.

**Biology:** Inhabits various types of deserts and dry steppes. Prefers to settle along dry river valleys, ravines, forest shelter belts, near abandoned irrigation ditches and in sparse thickets of bushes, concentrating in oases and around villages. Avoids areas with high dense grass. He digs holes himself, rarely uses abandoned burrows of turtles, gerbils, foxes. Active in the dark.

**Biotopes:** 1, 2, 3, 7

1	2	3	4	5	6	7	8	9	10	11	12
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## **Red Fox**

*Vulpes vulpes*

**Field marks:** The size of a medium-sized dog. The color is rufous, yellowish-gray or yellow, the chest and end of the tail are white. The muzzle and ears are pointed, the tail is fluffy.

**Status:** Common species.

**Biology:** Found in many biotopes. Often found around settlements. With an exception of the breeding season, it leads a solitary lifestyle. Monogamous. Omnivorous.

**Biotopes:** 1, 2, 3, 5

1	2	3	4	5	6	7	8	9	10	11	12
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## **Corsac Fox**

*Vulpes corsac*

**Field marks:** Externally similar to the common fox, but slightly smaller. The head is large, the ears are large and wide at the base. Fur is reddish-brown or reddish-gray with a silvery shade, the end of the tail is dark.

**Status:** Common species.

**Biology:** Inhabits dry steppes and semi-deserts, prefers places with hilly relief, occurs along river valleys, dry beds, on fixed sands. Monogamous. Omnivorous.

**Biotopes:** 1, 2, 3, 5

1	2	3	4	5	6	7	8	9	10	11	12
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## *Wolf* *Canis lupus*

**Field marks:** The size of a large dog. The fur is light gray with an admixture of rusty-ocher and black tones.

**Status:** Unevenly distributed throughout the country, rare in some places.

**Biology:** Can be found in various biotopes. Monogamous. For most of the year, wolves have a nomad life singly and in family groups - in packs. Winter packs can number up to 10 individuals.

**Footprints:** The traces of the wolf are large, elongated, the length of the print is 10-18 cm, the width is 5-10 cm. The two middle fingers are extended forward. The location of the tracks is in a line. Unlike wolf, dog tracks are wide, the front toes are closer to the back, and the location of the tracks is in a zigzag (along a broken line).



**Biotopes:** 1, 2, 3, 5



## *Northern Mole Vole* *Ellobius talpinus*

**Field marks:** Small animal (body length 10-13 cm). The eyes are very small, has no auricles. The color is gray-brownish with a black forehead, the belly is gray.

**Status:** Common species.

**Biology:** Inhabits flat steppes and semi-deserts. Settles in colonies, leads an underground lifestyle. Digs complex burrows in a wide variety of soils. Feeds with underground parts of plants, creates a complex network of forage passages, throwing the soil out. The ejections have asymmetric form of mounds up to 20 cm high. Active mainly at dusk. In winter, as well as in extreme heat and drought, activity is reduced.

**Biotopes:** 1, 2



## ***Libyan Jird***

*Meriones libycus*

**Field marks:** Body length up to 17 cm, tail length equal to body length. The main part of the tail is sandy-red, contrasting sharply with the general brownish-sandy tone of the upper body. The «whisk» on the tail is well developed, black or black-brown.

**Status:** Common resident species in the southern regions of the country.

**Biology:** Lives in desert and semi-desert. A characteristic inhabitant of fixed sands. Settles in colonies, forming settlements characteristic for gerbils. Lives in burrows. Active during the day mainly in winter, at night - in the warm part of the year.

**Biotopes:** 2, 3

1	2	3	4	5	6	7	8	9	10	11	12
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## ***Great Gerbil***

*Rhombomys opimus*

**Field marks:** The largest of the gerbils. Body length up to 20 cm, tail length up to 16 cm. Externally looks similar to a rat. The muzzle is dull. The color is sandy yellow, orange, dark yellow or dark grayish yellow. The abdomen is whitish. There is a tassel at the end of the tail.

**Status:** Common resident species in the southern regions of the country.

**Biology:** Inhabits hilly and ridge-hilly sandy deserts. Not found on bare takyrs, solonchaks and loose sands devoid of vegetation. Lives in large colonies up to several dozen individuals, in burrows. Active during daylight hours. In summer, the animals take a break for hot daytime hours. In the cold season, it is active mainly in the middle of the day. During severe frosts and snowfalls, it may not come to the surface for several days.

**Biotopes:** 1, 2

1	2	3	4	5	6	7	8	9	10	11	12
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**House Mouse**  
*Mus musculus*

**Field marks:** Body length up to 10 cm, tail length equal to body length or slightly less. The color is gray or brownish-gray, monotonous, the abdomen is slightly lighter. The ears are not big, rounded.

**Status:** Widespread species.

**Biology:** Lives in human settlements. Active at night all year round.

**Biotopes:** 7

1	2	3	4	5	6	7	8	9	10	11	12
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**Yellow Souslik**  
*Spermophilus fulvus*

**Field marks:** Large souslik, the size of a cat. The length of the body is from 20 to 40 cm, the tail is up to 12 cm. The color from above is uniformly in sandy-yellow tones, sometimes with a reddish tint.

**Status:** Common resident species in the southern half of Kazakhstan.

**Biology:** Inhabits semi-deserts, prefers places with moderately dense sandy soil. Also prefers places with rare grass, where it is easier to notice danger in time. Usually live in groups, but each animal has a separate burrow and its own territory. Active during the day. Goes into deep hibernation.

**Biotopes:** 1

1	2	3	4	5	6	7	8	9	10	11	12
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## *Tolai Hare*

*Lepus (capensis) tolai*

**Field marks:** Summer fur is brownish-gray, ocher-gray. Winter fur is slightly lighter than summer fur, with pronounced streaks. Throat and belly are white. The ears are long and wide, with dark spots at the tips. The tail is white below, black above.

**Status:** Common resident species in the southern half of Kazakhstan.

**Biology:** Inhabits semi-deserts and deserts. Within the desert zone, it is more often found in hilly sands, much less often in dune sands, and especially rare in clay deserts. Often settles along the banks of water bodies (lakes, rivers and streams). Active mainly at dusk and at night.

**Biotopes:** 1, 2, 3, 5



## *Saiga antelope*

*Saiga tatarica*

**Field marks:** A small antelope, the size of a sheep. Males are larger than females and have horns. An enlarged nose gives the saiga its characteristic appearance. In the warm season, the general color tone is golden-sandy; in winter, the saiga is overgrown with thick light, even almost white, fur.

**Status:** Rare species. Listed in the IUCN Red List as critically endangered (CR).

**Biology:** Typical inhabitant of steppes and semi-deserts. Keeps in groups from several tens to several hundred individuals. Carries out seasonal migrations, migrating to the southern regions of the semi-desert for the winter. Often visits shores, most likely for salt.

**Footprints:** Trace has a characteristic «heart» shape.

**Biotopes:** 1, 2



# APPENDICES

# GLOSSARY

**Alternate** – alternate arrangement of leaves (view the Terms below).

**Appressed-hairy** – the hairs covering the surface of the plant are pressed against this surface.

**Biconcave** – a form in which the fruit or other organ of the plant has a concavity on both sides.

**Bracts** – modified leaves, in the axils of which flowers or inflorescences are formed.

**Bulbous nodules** – bulb-like thickenings or extensions.

**Compound fruit** – a collection of fused or closely related fruits.

**Curved peduncles** – the section of the stem with flowers, curved in shape.

**Felt-pubescent** – very dense pubescence with fine hairs.

**Filamentary** – similar to a thread, thin and long.

**Glabrous** – without pubescence and irregularities, smooth.

**Halophilic** – an organism requiring a highly concentrated saline solution for normal growth.

**Halophyte** – plants capable of tolerating high levels of soil salinity.

**Linear** – elongated, long like a ruler.

**Linear-oblong** – view the Terms below.

**Long petiole** – the leaf has a long petiole (awn with which the leaf is attached to the trunk).

**Lumpy** – similar to a tubercle.

**Oblong-ovate** – elongated and similar in shape to an egg.

**Oblong-spatulate** – elongated, similar to a shovel.

**Obovate** – the shape of leaves or fruits, in which it has the shape of an egg, and attachment to the trunk is from the narrow side.

**Ovate** – similar in shape to an egg.

**Panicle** – view the Terms below.

**Paniculate Inflorescence** – view the Terms below.

**Pedicel** – a shoot carrying a flower at the top.

**Peduncle** – the section of the stem with flowers.

**Perianth** – the outer part of the flower.

**Petiolate** – has a petiole (for leaves).

**Pistil** – female reproductive organ of flowering plants.

**Pubescence** – covering the surface of a plant with outgrowths – hairs.

**Rhizome** – modified shoot, usually underground, with underdeveloped or early dying leaves.

**Rough** – not smooth, with slight irregularities on the surface.

**Salsola vegetation** – vegetation is represented by types of burrobrush.

**Scabrous** – not smooth.

**Saphoid** – boat-like in shape (elongated).

**Sedentary** – has no petiole (for leaves).

**Short-petiolate** – it has a short petiole.

**Solonchak** – a type of soil characterized by the presence of easily soluble salts in the upper horizons in quantities that hinder the development of most plants, with the exception of halophytes.

**Solonetzic** – containing sodium salts (about soils).

**Synanthropic** – synanthropic organisms are animals (not domesticated), plants and microorganisms whose lifestyle is associated with humans and their housing.

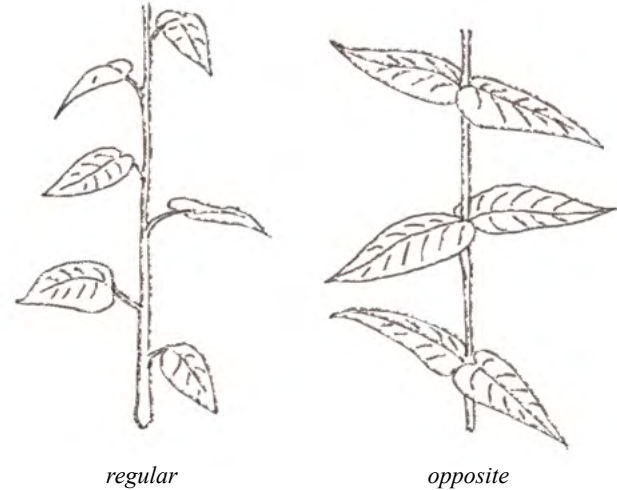
**Takyr** – the shape of the relief formed during the drying of saline soils in deserts and semi-deserts. For takyr, drying cracks are characteristic, forming a characteristic pattern on clay soil.

**Tuberous** – it looks like a bump.

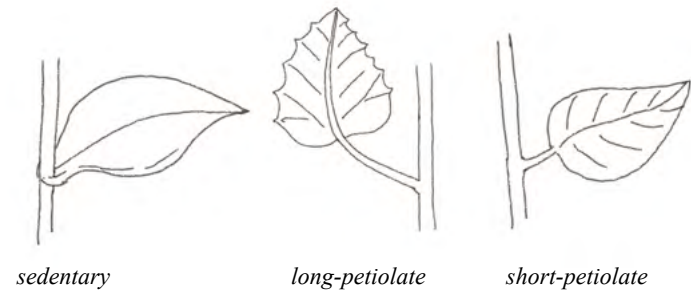
**Wedge-shaped** – narrowed into a triangle (base of the leaf).

## TERMS USED IN PLANTS' DESCRIPTIONS

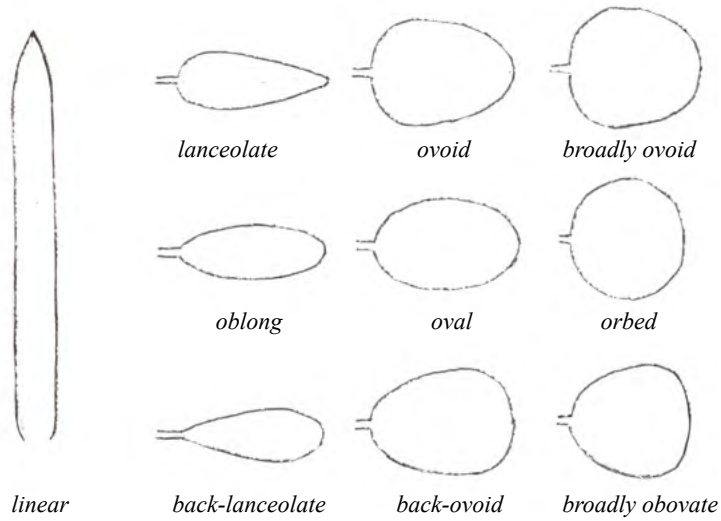
### *Leaves arrangement*



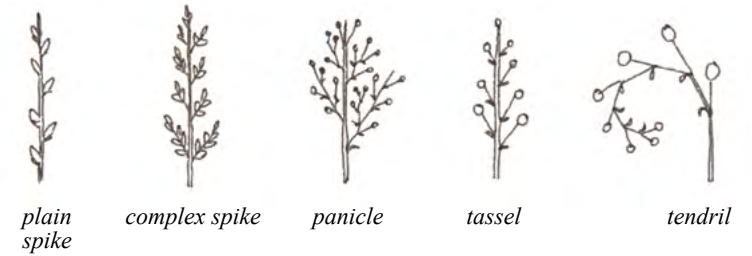
### *Leaf attachment*



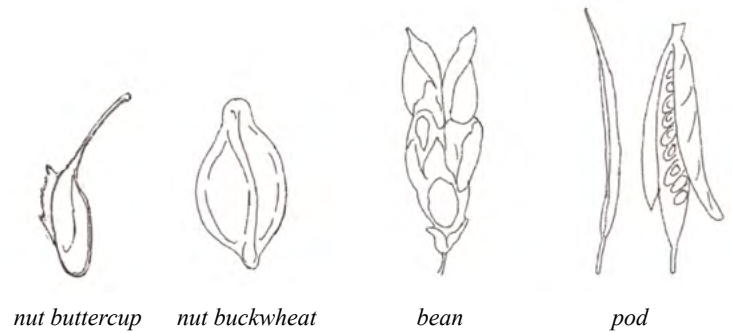
## Leaf shape



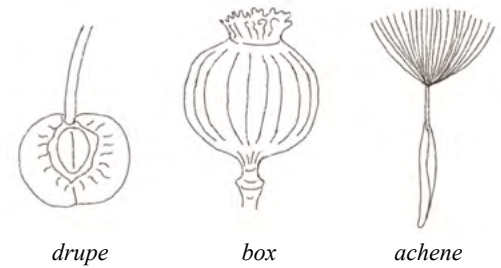
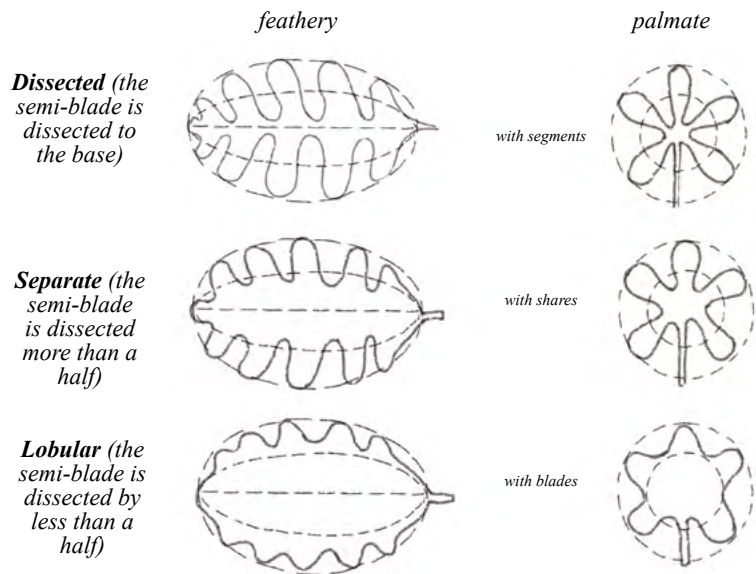
## Inflorescences



## Fruits



## Leaf partition type



## LIST OF SOURCES AND ADDITIONAL INFORMATION

### ***BASELINE STUDY***

Kazecoproject LLP. *Environmental Baseline Survey in the area of Tengiz field 2010-2014.*

### ***INTERNET RESOURCES***

- Community of Naturalists - [www.inaturalist.org](http://www.inaturalist.org)
- Plants and lichens of Russia and neighboring countries: an open online atlas and a guide to plants - [www.plantarium.ru](http://www.plantarium.ru)
- Amphibians and reptiles of Kazakhstan - [www.reptilia.club](http://www.reptilia.club)
- Birds of Kazakhstan - [www.birds.kz](http://www.birds.kz)

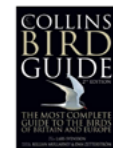
### ***PRINTED PUBLICATIONS***



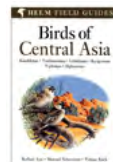
Рябицев В.К., Ковшарь А.Ф., Ковшарь В.А., Березовиков Н.Н. *Полевой определитель птиц Казахстана [A Field Guide to the Birds of Kazakhstan]. 2014.*



Рябицев В.К. *Птицы Средней Азии. Справочник-определитель в 2 томах [Birds of Central Asia, Vol. 1 and Vol. 2]. 2019*



L. Svensson. *Collins Bird Guide. The most complete guide to the birds of Britain and Europe. 2010.*



R. Ayé. *Birds of Central Asia. 2012.*



