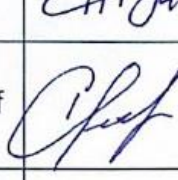
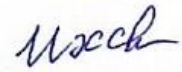
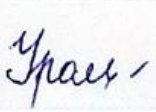
JSC «Kazakhtelecom»
LLP «KAZTEKO»

REPORT ON MONITORING AND ASSESSMENT OF THE IMPACT OF ACTIVITIES OF JSC KAZAKHTELECOM ON BIODIVERSITY, LAND, WATER RESOURCES, PHYSICAL IMPACT

Director LLP «KAZTECO» A.T. Nurtazin

Astana, 2023

List of performers

Chief Project Engineer		Department head – Balturin A.B.
Collection of climate data and analysis of atmospheric air monitoring		Ecological engineer – Tuyakov A.A.
Collection of soil data and analysis of monitoring results		Ecological engineer – Tuyakov A.A.
Collection of hydrological material and analysis of the results of monitoring of reservoirs		Engineer ecologist-geologist – Zhubanazarova Zh.T.
Collection and analysis of geobotanical information and analysis of floristic researchings		Ecological engineer - Ermekbai A.A
Collection of zoological information and analysis of the results of enotomological studies and their thyofauna		Ecological engineer - Ermekbai A.A
Design of cartographic material		GIS specialist - Ihksanov A.T.
Chemist-laboratorian		Uralbaeva A.K.

Content

Annotation 5
1. General information about the company 8
2. Brief natural and climatic characteristics of the area of location of the enterprise 9
3. Characteristics of the object as a source of influence on the environment 14
4. Brief description of technological equipment as a source of influence on the atmosphere 15
4.1. Ambient air monitoring. Monitoring methodology. Atmospheric air measurement points 16
5. Characteristics of land resources of Kazakhstan 25
5.1. Brief description of technological equipment as a source of influence on land resources 27
5.2. Monitoring of land resources. Monitoring methodology. Soil sampling points 31
6. Characteristics of water resources of Kazakhstan 37
. 37
6.1. Brief description of technological equipment as a source of influence on water resources 38
6.2. Monitoring of water resources. Monitoring methodology. Water sampling points 40
6.2.1. Analysis of the water monitoring results of JSC Kazakhtelecom in comparison with the monitoring results of the RSE Kazhydromet 49
7. Characteristics of biodiversity of the regions of Kazakhstan 53
7.2. Brief description of production technology and technological equipment in terms of impact on fauna and characteristics of sources of influence 63
7.3. Characteristics of production technology and technological equipment from the point of view of the influence of the biological system of reservoirs 64
7.3.1. Zooplankton in the study area 65
7.3.2. Ichthyofauna in the study area 66
8. Monitoring of physical impact. measurement method. selection points 71
8.1. Characteristics of technological equipment in terms of physical impact 71
8.2. Results of monitoring physical impact factors at the facilities of Kazakhtelecom JSC 72
9. Conclusion 77
10. Recommended activities for management of biodiversity, land, water resources 78

Appendix A. 79
Table H.1 – Taxonomic composition of plant diversity 79
Table H.2 – Taxonomic composition of the diversity of terrestrial invertebrates 116
Table H.3 – Taxonomic composition of terrestrial vertebrate diversity 143
Table H.4 – Taxonomic composition of the diversity of aquatic invertebrates and fish 176
Appendix B 183
Table U.1 – Indicator species of trees and shrubs 184
Table U.2 - Indicator species of herbaceous plants 185
Table U.3 – Phenological phases of trees and shrubs, according to observations in 2023. 187
Table U.4. - Phenological phases of herbaceous plants, according to observations in 2023. 190
Table U.5 - Productivity of trees and shrubs (in points), according to observation data in 2023. 192
Appendix D 1 193
Ecological passport of the river Syrdarya 193
Appendix D 2 201

Ecological passport of the river Chu 201
Appendix D 3.....207
Ecological passport of the river Tobol.....207
Appendix D 4.....212
Ecological passport of the river Ory.....212
Appendix D 5.....217
Ecological passport of the river Bukhtarma 217

Book 2

Appendix 1. License for environmental design……..2

Appendix 2. Title documents of KazTEKO LLP……..4

Appendix 3. Agreements for the provision of sevies……6

Appendix 4. Situational diagram with location of emission sources……..28

Appendix 5. Accreditation certificate of the testing laboratory……29

Appendix 6. Data sheets of measuring instruments……35

Appendix 7. Certificates of verification of measuring instruments……108

Appendix 8. Scheme maps of field research routes……110

Appendix 9. Field research schedule……115

Appendix 10. Protocols of atmospheric air measurements……121

Appendix 11. Soil sampling protocols……130

Appendix 12. List of equipment crossing water bodies……....137

Appendix 13. Water sampling protocols……..206

Appendix 14. Protocols for measuring physical parameters……216

Appendix 15. List of references and sources of information used in the report……..227

Annotation

The research was carried out as part of the implementation of the Roadmap for the development of ESG practices of JSC Kazakhtelecom (Minutes of the in-person meeting of the Board of Directors of JSC Kazakhtelecom No. 2 dated 00.14.2023.

JSC Kazakhtelecom (hereinafter referred to as the Company), for the implementation of paragraph 17 of section E of the above roadmap, entered into a Service Purchase Agreement No. 861994/2023/1 dated June 21, 2023 (Appendix 3) with LLP KAZTECO (license for environmental design in the Appendix 1).

From July 28 to August 8, 2023, field research was carried out in 6 regions of the Republic of Kazakhstan: Aktobe, Kyzylorda, Turkestan, Zhambyl, East Kazakhstan, Kostanay regions. During the field research, atmospheric air measurements were taken, soil and water samples were taken, and physical parameters were measured, species of fauna and vegetation, soil types and their condition in areas where telecommunications equipment was present were determined.

The company is the national communications operator of Kazakhstan, providing a range of infocommunication services: telephony, data networks, broadband Internet access, IPTV, hosting, SIP telephony, video meetings. Today the Company covers all major target markets of consumers of infocommunication services. It is engaged in the implementation of a number of large infrastructure projects, the modernization and digitalization of telecommunications networks, the introduction of new technologies and the provision of telephones to villages, as well as the development of broadband Internet access. The company is also implementing key programs to develop existing fixed-line services, primarily based on fiber-optic technologies, including the provision of high-speed fixed Internet access, rental and reservation of channels, provision of private virtual networks (IP VPN) and packaging of services based on fixed access.

The Company's facilities are located throughout the Republic of Kazakhstan: the company's regional and city telecommunication networks are located in 237 settlements, of which:

17 cities of republican significance

24 small towns

159 district centers

54 settlements with a dedicated zone code (former regional centers).

A situational diagram of the location of the Company’s facilities is given in Appendix 4.

The total number of atmospheric air measurements was 9 (9 points for 1 ingredient).

Measurements of atmospheric air pollution in the current situation were carried out using the 1st ingredient: inorganic dust. To determine the maximum one-time surface concentration, measurements were carried out in three series, taking into account the wind direction, at a height of 1.5-2.0 m from the ground surface.

The total number of soil samples was 49 measurements (7 points of 7 ingredients).

Soil analysis for the presence of pollutants for the current situation was carried out according to 7 items:

hydrogen ion concentration PH,

chloride concentration,

concentration of sulfates mmol at 100 g%,

concentration of petroleum products mg/g,

copper concentration mg/g, zinc concentration mg/g,

lead concentration mg/g.

The total number of water samples was 80 (5 points for 16 ingredients).

Water analysis for the presence of pollutants in relation to the current situation was carried out for 16 items:

Hydrogen ion concentration

Suspended solids

Bicarbonate ion concentration

Chloride ion concentration

Sulfate ion concentration

Phosphate ion concentration

Ammonium salt concentration

Nitrite ion concentration

Nitrate ion concentration

Calcium concentration

Magnesium concentration

Concentration of petroleum products

Phenol concentration

Concentration of surfactants

Iron concentration

Dry residue content.

Measurements of electromagnetic radiation were carried out in places where telecommunications equipment is present.

The total number of surveyed sites is 9 in 6 regions of the Republic of Kazakhstan:

Kyzylorda region Karmakshinsky district, Coordinates: 45.468256, 64.066397

Zhambyl region Kordai district, Coordinates: 43.271974, 74.203983

Altai district, East Kazakhstan region Coordinates: 49.692209, 84.337025

East Kazakhstan region Altai district New Bukhtarma village, Coordinates: 49.628327, 83.502289

East Kazakhstan region Katon-Karagay district, Coordinates: 49.206511, 84.403549

Akmola region Zhaksyn district, Coordinates: 51.925395, 67.131902

Kostanay region Denisovsky district, Coordinates: 52.466527, 61.733273

Kostanay region 52.466527, 61.733273, Coordinates: 52.864785, 62.812282

Aktobe region Khromtau district, Coordinates: 50.125679, 59.085216

Studies have shown that the Company's activities do not have a negative impact on the environment in the areas where it operates. If the existing operating mode is maintained, no negative impact on the environment is expected.

1. GENERAL INFORMATION ABOUT THE COMPANY

The certificate gives the right to carry out activities in accordance with the constituent documents within the framework of the legislation of the Republic of Kazakhstan (legal documents are given in Appendix 2).

1.	**Name of company**	JSC Kazakhtelecom
2.	BIN	941 240 000 193
3.	Location of the legal entity	Astana city, Yesilsky district Sauran street, 12
4.	Certificate of registration of the branch	04.12.2007

1.	**Name of company**	LLP KAZTECO
2.	BIN	151 240 023 058
3.	Location of the legal entity	Aktobe region, Alginsky district, Alga, microdistrict 4.15, apartment 2
4.	Certificate of registration of the branch	12/29/2015

2. BRIEF NATURAL AND CLIMATIC CHARACTERISTICS OF THE AREA OF LOCATION OF THE ENTERPRISE

The company has two main offices located in the cities of Astana and Almaty. Regional representative offices (branches) are available in all regions of Kazakhstan, in all its parts.

Natural and climatic conditions. Depending on the natural and climatic characteristics, the territory of Kazakhstan is divided into 10 natural zones:

The forest-steppe zone occupies the northern part of the North Kazakhstan region. The area of the zone is 0.8 million hectares, including 0.5 million hectares of agricultural land.

The steppe zone includes the northern part of the Aktobe, Akmola, Kostanay, Pavlodar regions, the main territory of the North Kazakhstan region with a total area of 26.5 million hectares, of which 23.5 million hectares are agricultural land.

The dry steppe zone covers the northern part of Aktobe, West Kazakhstan, the central territory of Kostanay, the main part of Pavlodar, southern Akmola, northern part (Semipalatinsk region) and the foothill territory of East Kazakhstan regions. The area of the zone is 62.4 million hectares, including agricultural land - 54.7 million hectares. The main areas of arable land are located in the steppe and dry steppe zones. The main grain production is concentrated here.

The semi-desert zone occupies the central part of the West Kazakhstan, Aktobe, Kostanay, Karaganda regions, the main part of the Semipalatinsk region, and the flat territory of the East Kazakhstan region adjacent to Lake Zaisan. The area of the zone is 37.2 million hectares, of which agricultural land is 33.9 million hectares.

The desert zone is the largest in terms of territory size and includes the southern part of West Kazakhstan, Aktobe, Karaganda, southwestern East Kazakhstan, northern Turkestan, Zhambyl, Almaty regions, the main territory of Atyrau, Mangistau, Kyzylorda regions. Its area is 112.1 million hectares (41.1% of the territory of the republic). 37.6% of agricultural land (83.4 million hectares) is concentrated here.

The foothill-desert-steppe zone covers the foothills of the Turkestan, Zhambyl, Almaty regions, minor territories of the Kyzylorda and East Kazakhstan regions. Its area is 12.3 million hectares, including 10.2 million hectares of agricultural land.

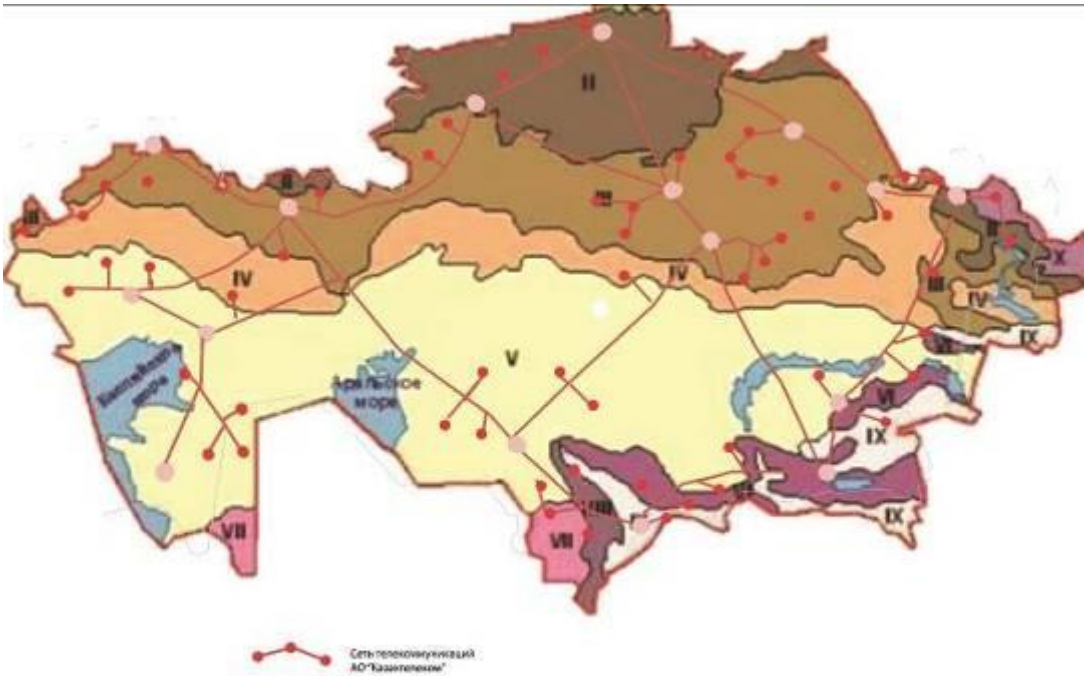
The subtropical desert zone occupies the southwestern part of the Turkestan region and a small territory in the extreme south of the Mangistau region with a total area of 4.4 million hectares, of which 3.8 million hectares are agricultural land.

The subtropical-foothill-desert zone is identified in the mountainous territories of the western Tien Shan of the Turkestan region on an area of 3.5 million hectares. It contains 3.1 million hectares of agricultural land.

The Central Asian mountain zone includes the territories of the Tien Shan and Dzhungar Alatau mountain ranges within the Turkestan, Zhambyl, Almaty and southern parts of the East Kazakhstan regions. Its area is 10.1 million hectares, including agricultural land - 7.1 million hectares.

The South Siberian mountain zone covers the Altai mountains in the northeastern part of the East Kazakhstan region, with an area of 3.2 million hectares, of which 1.4 million hectares are agricultural land.

Natural zoning is important in the implementation of government programs and forecasts for the rational use of land, the development of rural areas, other sectoral and regional programs and measures for the use and protection of land in each region of the country.



II	степная	26,5	9,7	23,5	10,7
III	сухостепная	62,4	22,9	54,7	24,9
IV	полупустынная	37,2	13,7	33,9	15,4
V	пустынная	112,1	41,1	81,4	37,2
VI	предгорно-пустынно-степная	12,3	4,5	10,2	4,7
VII	субтропическая пустынная	4,4	1,6	3,8	1,7
VIII	субтропическая предгорно-пустынная	3,5	1,3	3,1	1,4
IX	среднеазиатская горная	10,1	3,7	7,1	3,2
X	южно-сибирская горная	3,2	1,2	1,4	0,6
		272,5	**100**	**219,6**	**100**

Picture 2.1. Natural and climatic zoning

Climate. The climate of Kazakhstan is sharply continental and relatively dry. Air temperature fluctuates throughout the year and day. Average annual precipitation ranges from 100–500 mm per year. The continental climate is manifested in a number of features. These include: a large amplitude between winter and summer temperatures, dry air, insignificant amounts of precipitation in most of the republic, long harsh winters and short summers in the north and short winters and long hot summers in the south. The geographical position of Kazakhstan in latitudinal terms corresponds to the countries of the Mediterranean, which have a humid subtropical climate, and the countries of central Europe, which have a temperate continental climate.

Since Kazakhstan is located in the center of the huge continent of Eurasia, at a considerable distance (thousands of kilometers) from the oceans and seas, their moderating effect on the climate is insignificant.

The republic is located in the southern part of the temperate climate zone. Four seasons of the year are clearly defined on its territory. In winter, severe Siberian frosts reign. In summer, tropical air masses dominate, forming over Kazakhstan and Central Asia. The continental climate enhances the seasonal amplitudes of summer and winter temperatures.

Solar radiation: The average annual duration of sunshine in the Republic is very long (approximately 2000-3000 hours). For example, in the north in Kostanay, it is equal to 2132 hours. This is 400 hours more than in Moscow, located at the same latitude. And in the south, in Kyzylorda, this figure is 3042. This duration of the aurora is explained not only by the geographical latitude of Southern Kazakhstan, but also by the fact that there is no cloudiness there in the warm season. It has been established that the number of clear days per year in the north of the country is 120, in the south 260, and the number of cloudy days in the north is 60, in the south in the Balkhash region - only 10 days.

Atmospheric precipitation: Precipitation is insignificant, most of it falls in spring and early summer. The driest months are July and August. Only in mountainous areas does precipitation occur all year round. In winter it snows. However, during thaws it may rain, causing ice. Especially on pastures where livestock are raised, mass mortality of livestock can occur due to lack of food, as the grass is covered with a layer of thin ice. These periods are called “Juts” by the Kazakhs. Snow falls throughout the country, with the exception of the outskirts of the southwest and south. But this especially applies to the north.

The soil. Kazakhstan is characterized by horizontal and vertical zoning of the soil cover, associated with changes in bioclimatic and lithological-geomorphological conditions due to the significant extent of the territory from north to south.

In the flat part of the republic, three main soil zones are distinguished: chernozems, developing north of 52° N. latitude, dark chestnut soils located between 48 and 52° N. latitude, brown and gray-brown desert soils (south of 48°N), alternating with massifs of desert sandy and takyr-like soils (Pic. 2.1.).

The chernozem zone is divided into a subzone of leached chernozems, which occupies a small part of the forest-steppe zone, a subzone of ordinary chernozems of the moderately arid steppe, and a subzone of southern chernozems of the arid steppe. In the subzone of leached chernozems, there are meadow-chernozem soils, solonetzes, solods, as

well as gray forest soils, which brings the forest-steppe of Kazakhstan closer to the forest-steppe of Western Siberia.

The zone of chestnut soils is divided into a subzone of dark chestnut soils of a moderately dry steppe, a subzone of typical chestnut soils of a dry steppe, and a subzone of light chestnut soils of a semi-desert.

In the zone of brown and gray-brown soils, there is a subzone of brown soils of the northern desert and a subzone of gray-brown soils confined to the middle and southern subzones of the desert.

The boundaries between soil subzones clearly coincide with climatic boundaries.

Along with the change in soil cover from north to south, significant changes are observed within each soil zone from west to east. This is due to the increasing continentality of the climate, differences in precipitation patterns, as well as lithological and geomorphological features.

In the mountainous regions of the south and southeast of Kazakhstan, four soil provinces are distinguished, differing in structure and the relationship of soil belts.

Western Tien Shan (within the South Kazakhstan region) province, which includes:

1. A belt of light, typical and dark gray soils of semi-desert piedmont plains and foothills.

2. Belt of mountain brown soils in the middle mountains.

3. Belt of mountain-meadow subalpine and alpine soils of the highlands.

North Tien Shan province (Kyrgyz, Zailiysky, Dzungarian Alatau and Ketmen ranges). It highlights:

1. Belt of low-carbonate (northern) gray soils and light chestnut soils of piedmont plains and foothills.

2. Belt of mountain dark chestnut soils and mountain chernozems of steppe lowlands.

3. Belt of mountain leached chernozems, mountain gray forest and mountain dark-colored forest soils of meadow-forest midlands;

4. Belt of mountain-meadow subalpine and alpine soils of the highlands.

In the foothills and low mountains of the Saur-Tarbagatai and Western Altai soil provinces, only one belt of mountain chestnut soils and mountain chernozems is distinguished. Above are the belt of mountain-meadow and gray forest soils of the mid-mountains and the belt of mountain-meadow subalpine and alpine soils. In the northern part of the Republic of Kazakhstan, chernozems predominate. They are located on the moist plains of the steppes. Their distribution zone is located throughout the North Kazakhstan region and is the main grain-producing region.

To the south of the chernozems are chestnut soils. Chestnut soils occupy Central Kazakhstan, part of the Caspian lowland. These soils are found in the steppe and semi-desert zones, occupying 34% of the country's territory. Humus content is 4-3%. They are divided into dark chestnut soils of the dry steppe, moderately dry steppe and light chestnut soils of the semi-desert.

The southern part of the territory is covered by brown and gray-brown soils. The humus content is low, about 1-2%. These areas are used mainly for livestock farming. Agriculture is possible only with irrigation.

In the Western Tien Shan mountain, there is a belt of brown soils; in the mountains of Tarbagatai and Western Altai there are chestnut, dark chestnut and chernozems. The soils of the foothills and mountains occupy 12.4% of the country.

Today in Kazakhstan there is a problem of soil erosion. According to the Institute of Soil Science of the Republic of Kazakhstan, about 26% of the country's soils are prone to erosion. About 52 million hectares are prone to wind erosion, 17 million hectares are prone to water soil erosion.

3. CHARACTERISTICS OF THE OBJECT AS A SOURCE OF INFLUENCE ON THE ENVIRONMENT

According to Article 12 of the Environmental Code of the Republic of Kazakhstan [1], objects that have a negative impact on the environment, depending on the level and risk of such impact, are divided into four categories:

1) objects that have a significant negative impact on the environment (objects of category I);

2) objects that have a moderate negative impact on the environment (objects of category II);

3) objects that have a slight negative impact on the environment (objects of category III);

4) objects that have minimal negative impact on the environment (category IV objects).

In accordance with the Decisions on determining the category of an object that has a negative impact on the environment, issued by territorial government bodies of the Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan, the Company's objects are assigned categories III and IV.

The main types of environmental impact are:

- ***emissions.*** Emissions of pollutants into the atmospheric air are generated from stationary (boiler houses, diesel generators) and mobile sources, which are short-term seasonal in nature or during the period of construction, installation and dismantling work.

- ***wastewater.*** Wastewater is generated from administrative buildings, discharge is carried out into the central sewerage networks in accordance with the agreement, with the exception of wastewater at the Company's facilities in the Zhambyl region. Wastewater at these facilities is discharged into screened septic tanks for subsequent disposal in accordance with the contract.

- ***waste.*** The Company generates both hazardous and non-hazardous waste. All waste has waste passports and is transferred to third parties for disposal or disposal.

4. BRIEF DESCRIPTION OF TECHNOLOGICAL EQUIPMENT AS A SOURCE OF INFLUENCE ON THE ATMOSPHERE

Telecommunications equipment is a set of technical means that are designed to transmit, receive and process information in telecommunication systems. It plays an important role in the modern world, providing communication between people in different parts of the planet.

The Company's telecommunications equipment is widely represented throughout Kazakhstan, which emphasizes its importance in providing communications and access to information for individuals and legal entities.

Telecommunications equipment includes devices ranging from simple phones and modems to complex network switches and servers. It is used in many industries such as telecommunications, information technology, aviation, defense and others.

The main task of telecommunications equipment is to ensure efficient and reliable transmission of information. This includes installing and maintaining network systems, setting up connections, and ensuring the security of transmitted data.

Modern telecommunications equipment not only transmits voice messages, but also transmits data via the Internet. Thanks to it, it becomes possible to communicate via video, exchange messages and access information in real time; without it, it would be impossible to provide global communication and quick access to information that is necessary in everyday life.

Almost every device that we use every day for communication, such as a telephone, computer or television, requires telecommunications equipment to function. It allows you to transmit voice and video signals, as well as exchange data via the Internet.

Telecommunications equipment is also used in the construction of communication networks, including cellular and wireline telephone networks, data networks, satellite communication systems and others. It ensures efficient and reliable transmission of information over long distances.

In addition, telecommunications equipment plays an important role in ensuring the safety and security of data during transmission. It allows you to encrypt information and control network access, protecting user privacy.

Telecommunications equipment includes various devices that perform different functions. All equipment for networks is divided into two groups - active and passive. Devices from the first group operate on electricity, but most importantly, they take an active part in the processes of processing and transmitting data between other network elements. In fact, such devices take on the task of transmitting, sorting and grouping information.

The task of passive telecommunication devices is clear from their name: they do not actively participate in the processing and transmission of data, but create conditions for the operation of the network. This group includes sockets, connectors, patch cords, couplings, cross-connectors, and the like.

Types and their main functions of equipment are:

- Routers: These devices are used to determine the path along which data should be sent on a network. They can do this based on various factors such as protocols, addresses, or link quality.

- Switches: These are devices that provide connection between different network segments. They allow you to transfer data between different devices, manage traffic and provide security.

- Modems: These devices are used to convert digital data to analogue format and vice versa. They allow devices to connect to a network and transmit data over data lines or telephone lines.

- Servers: These are powerful computers that provide various functions on the network, such as storing data, processing requests and providing services to users.

- Telephones: These are devices that are used for telephone communication. They allow voice signals to be transmitted over the network and provide communication between subscribers.

Telecommunication equipment plays a key role in the transmission and exchange of information between users. It provides the functionality necessary for efficient operation of communication networks.

Telecommunications equipment is most actively used by data transmission networks of the following types:

- structured cabling system (SCS) combines video surveillance areas, as well as telephone and local networks. It includes coaxial and optical cables and connectors, patch cords , twisted pairs, fiber optic equipment, distributors

- fiber-optic communication lines (FOCL) – acts as a system for transmitting information. Information flows are transmitted by dielectric light fiber.

The main requirement for telecommunications equipment is the interaction of devices with each other.

All of the above equipment mainly operates from the electrical network. It can be located in buildings, be free-standing structures, or be overhead or underground.

4.1. Ambient air monitoring. Monitoring methodology. Atmospheric air measurement points

The problem of environmental pollution, especially the air envelope of the Earth, is becoming more and more urgent over time. The basis for solving this problem lies in the development and improvement of environmental monitoring systems, carried out on a modern organizational and technological basis. The main areas of methodological support are analyzes of dust pollution and the presence of pollutants in the air.

Atmospheric air monitoring is a system of observing the state of atmospheric air, as well as assessing and forecasting the main trends in changes in atmospheric air quality in order to timely identify the negative impacts of natural and anthropogenic factors.

According to Article 183 of the Environmental Code of the Republic of Kazakhstan [1], industrial environmental control is mandatory only for operators of categories I and II . Since the Company's facilities belong to categories III and IV , this control is not carried out. The volume of pollutant emissions is determined by the calculation method. Emissions are of a short-term seasonal nature. On a quarterly basis, the Company provides a declaration on actual pollutant emissions into the environment for category 3 facilities.

The main types of air pollution in the Company are stationary (boiler houses and diesel generators) and mobile sources. Pollutant emissions can also be released into the atmospheric air during construction and installation work. For example, when laying a fiber optic cable. The cable is laid along existing infrastructure facilities - roads or railways. The cable is laid at a depth of 1.2 to 1.5 meters mainly by horizontal directional drilling (hereinafter referred to as HDD), HDD is the most convenient and safe method of laying fiber optic cable:

- firstly, the laying does not violate the integrity of existing buildings;

- secondly, reducing the time required for carrying out work in relation to trench types of laying;

- thirdly, the top soil layer, as well as the natural or artificial landscape, are not disturbed. Emissions of pollutants into the atmospheric air from transport and earthworks are significantly reduced.

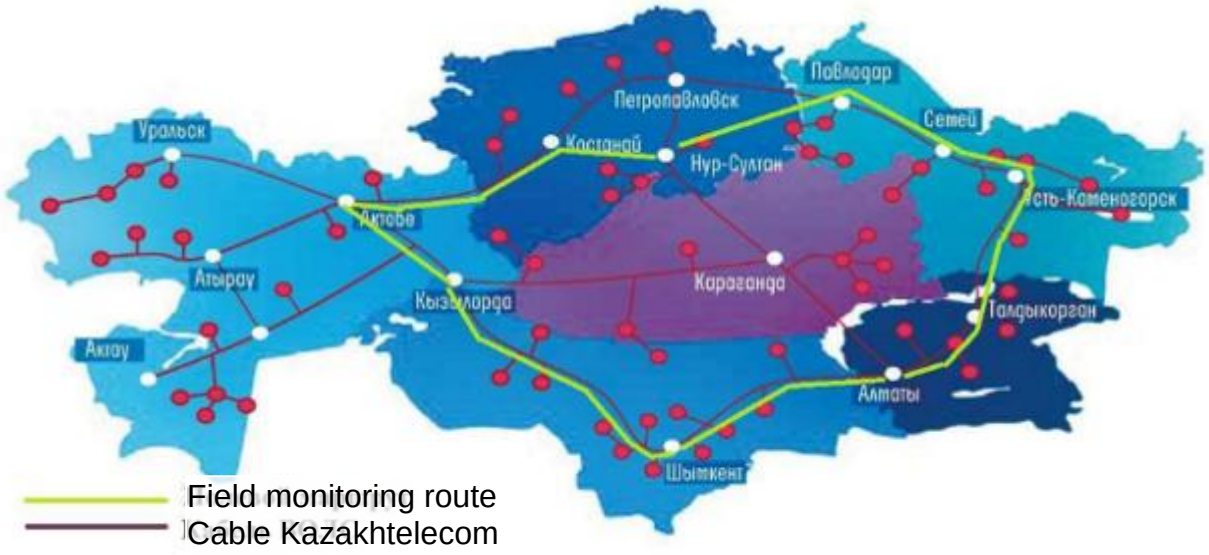
Emissions of pollutants into the atmospheric air during the operation of the fiber optic cable and antenna mast structures are possible only from moving vehicles on existing highways/ railroads or from objects that have sources of emissions of pollutants into the atmospheric air.

Batysekoproekt Research Institute LLP No. 5 dated 02/01/2023 (accreditation certificate No. KZ. T .05.0903 dated 08/07/2020. Valid until 08/07/2025) (documents are presented in Appendix 5).

As part of this monitoring and assessment of the impact of the Company's activities on the environment, measurements of atmospheric air were carried out away from residential areas in order to exclude the presence of anthropogenic influence and other sources of pollution.

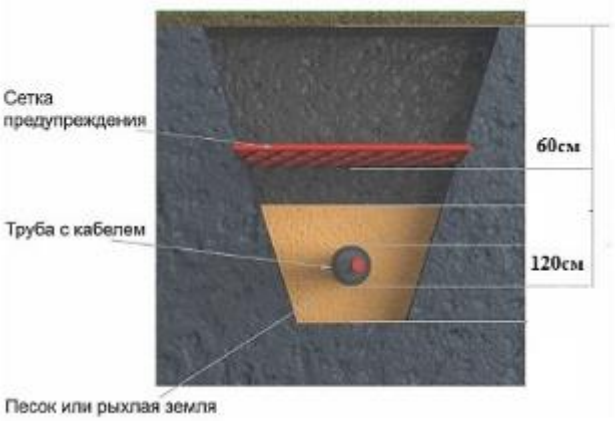
The main points for measuring atmospheric air are the places where the fiber optic cable passes and where the antenna mast structures are located. The field research schedule is presented in Appendix 9.

A schematic map of the field research routes is shown in Picture 4.1. and Appendix 8



Pic. 4.1. Scheme map of the field research route

Fiber optic cable is the main element of infrastructure used to transmit data and provide telecommunications between populated areas in Kazakhstan. It consists of several components that ensure reliable transmission of signals over optical fibers without loss or interference. Figure 3 shows the layout of the cable underground and the degree of insulation from external influences.



Pic. 4.2 Layout of fiber optic cable underground

The total length of the Company's fiber-optic communication lines as of August 2023 is about 85 thousand km

Currently, the Company has 17 data centers - specialized structures for hosting (hosting) server and network equipment, connecting subscribers to Internet channels, as well as for processing and storing information.

Antenna mast structure (AMS) Company is a structure that is used to install antennas and other communications equipment. It usually consists of a mast on which the antennas are mounted, and a foundation that ensures the stability of the structure. As a rule, such structures are built on hills or in open areas. Antenna mast structures are built at high elevations to ensure maximum coverage and reduce interference. The height of the structure allows the antennas to be installed at a greater distance from the ground, which increases the transmission range. In addition, at higher elevations there is less chance that the signal will be obscured by other structures or natural obstacles.

The Company's antenna mast structures vary in design, but typically consist of a mast on which the antennas are mounted and a foundation that provides stability to the structure. Masts are made of various materials such as steel, concrete or wood. In addition, different types of antennas and radio transmitting devices are installed on the masts, depending on specific needs. (photo 4.1., 4.2)

Photo 4.1. Monitoring in the tower area

Photo 4.2. AMC in Akmola region, Zhaksyn district.

Atmospheric air measurements were carried out in accordance with ST RK 2.302-2021 “Methodology for performing measurements. Determination of the mass concentration of harmful substances in the atmospheric air, in the air of the work area, in industrial emissions using a gas analyzer.”

Determination of the mass concentration of harmful substances in the atmospheric air and in the air of the working area was carried out using a gas analyzer "GANK-4", which has a valid verification certificate. (Appendix 6, 7)

To determine the maximum one-time surface concentration, measurements were carried out in three series, taking into account the wind direction, at a height of 1.5-2.0 m from

the ground surface. Since pollutants entering the atmospheric air are subject to dispersion under the influence of meteorological factors, measurements of these parameters were carried out during the monitoring period. Wind conditions and temperature have the greatest influence on the dispersion of impurities. The distribution of air pollutants was measured and analyzed at different distances from the source of pollution, taking into account meteorological conditions.

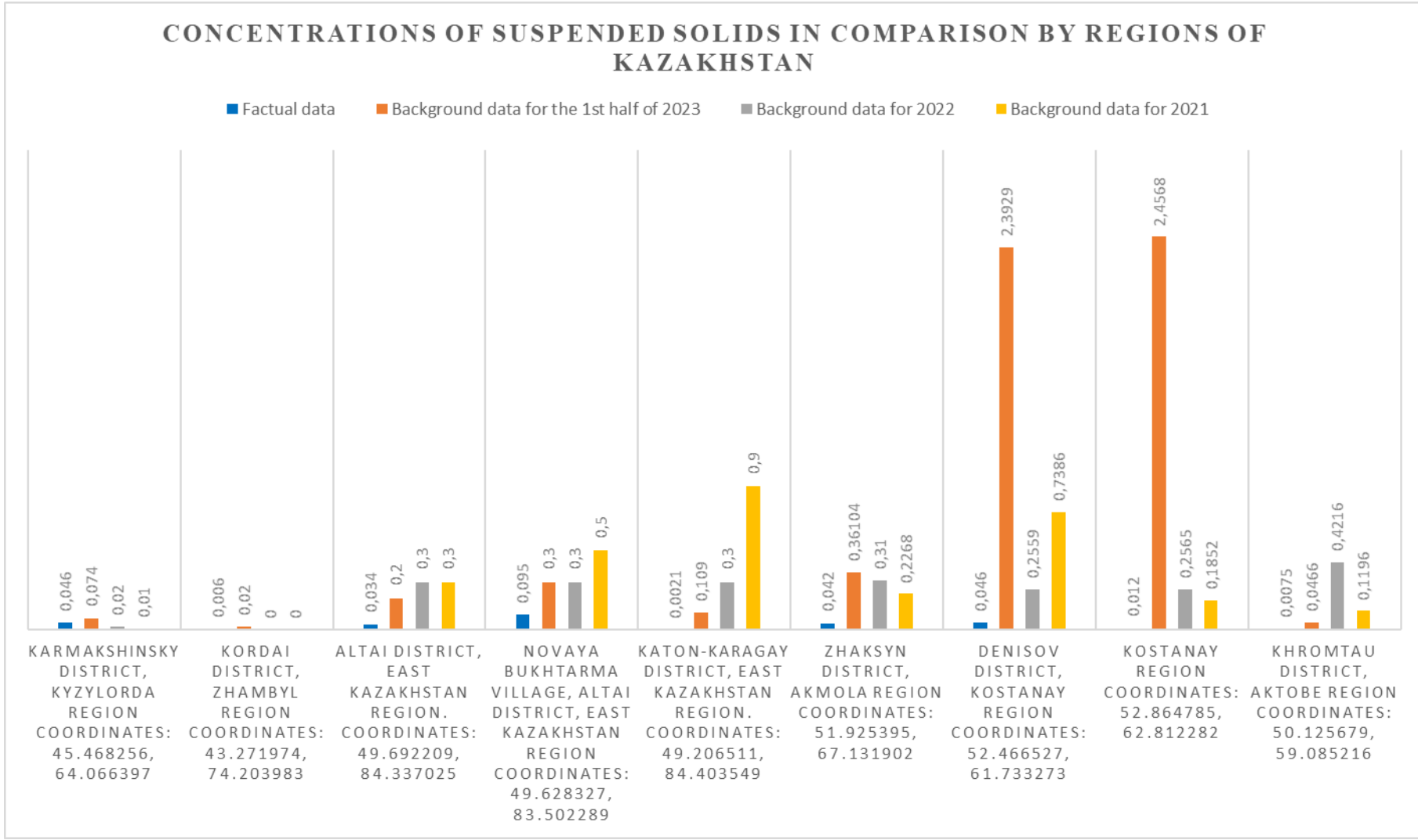
Atmospheric air measurement points and measurement results are given in Table 4.1.

Table 4.1.

Results of monitoring at the facilities of JSC Kazakhtelecom in comparison with the background 3-year data of the RSE Kazhydromet [3]

№	Sampling location	Indicators	Factual data for 2023	MAC	Background concentration values			Notes
					2023	2022	2021	
1.	Kyzylorda region Karmakshinsky district, Coordinates: 45.468256, 64.066397	Dust nonorganic	0,046	0,3	0,074	0,02	0,000	Background indicators from Akai village [3]
2.	Zhambyl Region Kordai district, Coordinates: 43.271974, 74.203983	Dust nonorganic	0,006	0,3	0,020	0,023	0,078	Background indicators from Kordai village [3]
3.	East Kazakhstan region Altai district, Coordinates: 49.692209, 84.337025	Dust nonorganic	0,034	0,3	0,200	0,3	0,300	Background indicators from Ridder city [3]
4.	East Kazakhstan region Altai district, Novaya Bukhtarma village, Coordinates: 49.628327, 83.502289	Dust nonorganic	0,095	0,3	0,300	0,3	0,500	Background indicators from Glubokoe village [3]
5.	East Kazakhstan region Katon-Karagay district Coordinates: 49.206511, 84.403549	Dust nonorganic	0,0021	0,3	0,109	0,3	0,900	Background indicators from Ust-Kamenogorsk city[3]
6.	Akmola region Zhaksynsky district Coordinates: 51.925395, 67.131902	Dust nonorganic	0,042	0,3	0,36104	0,31	0,2268	Background indicators from Kokshetau city [3]

№	Sampling location	Indicators	Factual data for 2023	MAC	Background concentration values			Notes
					2023	2022	2021	
7.	Kostanay region Denisov district, Coordinates: 52.466527, 61.733273	Dust nonorganic	0,046	0,3	2,3929	0,2559	0,7386	Background indicators from Zhetykara town [3]
8.	Kostanay region 52.466527, 61.733273, Coordinates: 52.864785, 62.812282	Dust nonorganic	0,012	0,3	2,4568	0,2565	0,1852	Background indicators from Arkalyk town [3]
9.	Aktobe region Khromtau district, Coordinates: 50.125679, 59.085216	Dust nonorganic	0,0075	0,3	0,0466	0,4216	0,1196	Background indicators from Khromtau town [3]



Pic. 4.2. Results of dust sampling, mg/m^3

1. Kyzylorda region Karmakshinsky district: Actual data (0.046) is below the MAC (0.3However, the background data for the 1st half of 2023 (0.074) exceeds the actual data, which may indicate a decrease in dust concentration.
2. Zhambyl region Kordai district: Actual data (0.006) is significantly lower than the MAC (0.3), which indicates a low dust concentration.
3. East Kazakhstan region Altai region: Actual data (0.034) is below the MAC (0.3), but background data for the 1st half of 2023 (0.2) and for 2022 (0.335) exceed the actual data.
4. East Kazakhstan region Altai district Novaya Bukhtarma village: Actual data (0.095) is below the MAC (0.3), but background data for the 1st half of 2023 (0.3) is equal to the MPC.
5. East Kazakhstan region Katon-Karagay district: Actual data (0.0021) is significantly lower than the MAC (0.3), which indicates a low dust concentration.
6. Akmola region Zhaksyn district: Actual data (0.042) is below the MAC (0.3), but background data for the 1st half of 2023 (0.36104) exceeds the MAC.
7. Kostanay region Denisovsky district: Actual data (0.046) is below the MAC (0.3), but background data for the 1st half of 2023 (0.2929) is close to the MAC.
8. Kostanay region: Actual data (0.012) is significantly lower than the MAC (0.3), which indicates a low dust concentration.
9. Aktobe region Khromtau district: Actual data (0.0075) is significantly lower than the MAC (0.3), which indicates a low dust concentration.

An analysis of the actual concentrations of inorganic dust in the atmospheric air in comparison with background values for 2021-2023 (Picture 4.2.) indicates that there is no impact from the fiber optic cable and antenna mast structures on the atmospheric air.

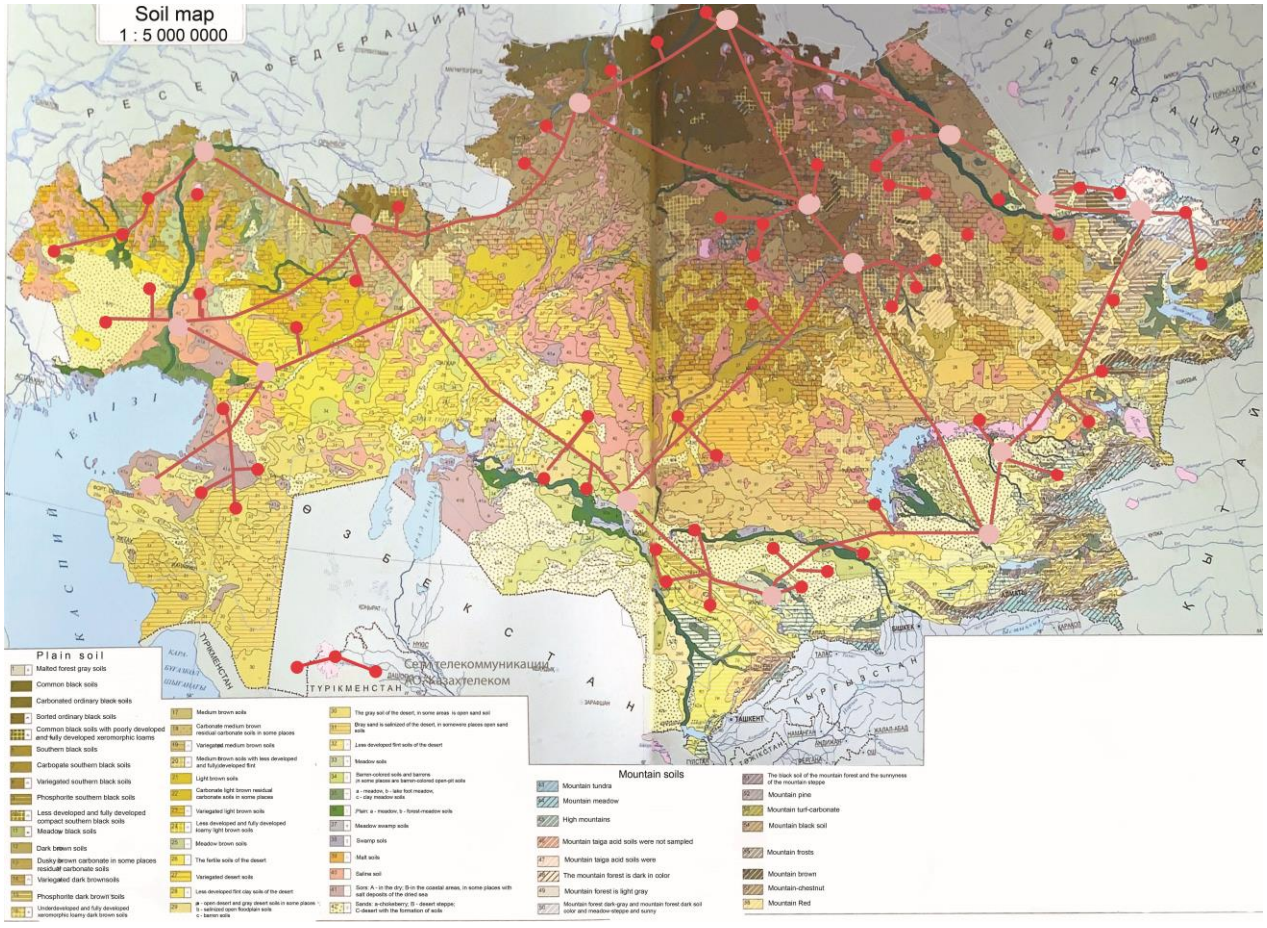
5. CHARACTERISTICS OF LAND RESOURCES OF KAZAKHSTAN

The diversity of soil cover in Kazakhstan, due to different climatic and geological conditions. The distribution of soils on the territory of the republic is subject to the laws of horizontal and vertical soil zonation.

The flat territory of the Republic of Kazakhstan in the direction from north to south is represented by four soil zones: moderately humid forest-steppe zone of gray forest soils, leached chernozems and meadow-chernozem soils; moderate-arid steppe zone of ordinary and southern chernozems; dry steppe and desert-steppe zone of chestnut soils and desert zone of brown and gray-brown soils (Fig. 5.1.).

The geographical boundaries of natural zones correspond to the area of zonal soil types: gray forest soils, chernozems, chestnut soils and brown desert soils. According to the degree of severity of bioclimatic conditions, the manifestation of the main and superimposing processes of soil formation, natural and soil zones are divided into subzones with corresponding subzonal soil subtypes.

The moderately humid forest-steppe zone of gray forest soils, leached chernozems and meadow-chernozem soils is included within the borders of Kazakhstan on its southern outskirts and occupies a relatively small territory, with an area of about 800 thousand hectares in the northern part of the North Kazakhstan region.



Pic. 5.1. Characteristics and composition of soils in the locations of the telecommunications network of JSC Kazakhtelecom

The soil cover is heterogeneous and depends on the drainage conditions of the relief. Zonal soils rarely occur in large homogeneous massifs, but form a complex mosaic of soil combinations - combinations, complexes and patchiness with meadow-chernozemic solonetzic soils, solonetzes, solods and meadow soils.

Leached chernozems are common in the riverine parts - ridges, and in the inter- ridge hollows there are hydromorphic and semi-hydromorphic soils. Under the microwedges with thickets of aspen-birch forests (kolki) lie gray forest solodized gley soils.

There are 15.7 thousand hectares of gray forest soils, of which 9.5 thousand hectares are agricultural lands.

There are 484.8 thousand hectares of leached chernozems, including 381.2 thousand hectares of agricultural land.

The forest-steppe zone of gray forest soils and leached chernozems is characterized by the highest percentage of arable land, which is 48.6%, with the average for the republic being 12.4%.

Chernozem soils on the territory of the Republic of Kazakhstan are distributed in the northernmost part. This zone covers the entire North Kazakhstan region, most of the Kostanay region, the northern parts of the Akmola , Pavlodar, Aktobe and West Kazakhstan regions and occupies 25.5 million hectares, or 9.5% of the territory of the republic. Chernozem soils are divided into three subtypes: leached chernozems - occupy the southernmost part of the forest-steppe zone, ordinary and southern chernozems are characteristic of the steppe zone.

All chernozem soils are fertile, but the first two have a thicker layer of humus (6-8%), and in the southern chernozems there is less humus (4-6%). Chernozem soils are common on well-moistened steppe plains and are the main grain-producing region of the republic.

Chestnut soils are located south of chernozem soils. They occupy most of Central Kazakhstan, the north of the Caspian lowland, and the plains of the East Kazakhstan region. These soils dominate in the south, in the dry steppe and semi-desert zones, which occupy 90.6 million hectares, or 34% of the territory of the republic.

Chestnut soils (photo 5.1.) are divided into three subtypes: dark chestnut soils of the moderately dry steppe and chestnut soils of the dry steppe, as well as light chestnut soils (photo 5.2.) of the semi-desert.

Photo 5.1. Chestnut soil of dry steppes

Photo 5.2. Light chestnut soil in Abai region

Soil fertility decreases to the south. Dark chestnut and chestnut soils contain 4.5-3.0% humus, light chestnut semi-desert soils have a higher humus content - 3.0-2.0%. Dark chestnut and chestnut soils of the dry steppe are suitable for rain-fed (i.e., no-irrigation) agriculture and animal husbandry, while light chestnut soils of the semi-desert are used mainly as pastures.

Photo 5.3. Gray-brown soils of the desert subzone

Photo 5.4.. Soil of the subzone of gray-brown soils in Zhambyl region

Brown and gray-brown soils (photos 5.3., 5.4.) are located south of chestnut soils and cover the southern part of Kazakhstan. They occupy 120 million hectares, or 44% of the republic's territory. The humus content in these soils is 2.0-1.0%. This is mainly a livestock-raising area; farming is possible only with irrigation.

5.1. Brief description of technological equipment as a source of influence on land resources

As already mentioned, fiber optic cable is the main element of infrastructure used to transmit data and provide telecommunications between populated areas in Kazakhstan. It consists of several components that ensure reliable transmission of signals over optical fibers without loss or interference.

The main components of a fiber optic cable are:

1. A fiber core is a thin glass or plastic conductor through which a light signal is transmitted. The fiber core is highly transparent and allows light to pass through it without significant loss. It can be single-mode (where light travels along a single path) or multimode (where light travels along multiple paths).
2. The sheath surrounds the fiber core and provides protection from mechanical damage. The shell is usually made of plastic or a special type of glass.
3. Protective layers: The cable also contains various protective layers to ensure durability and protection from external factors such as moisture, aggressive environments, mechanical stress, etc. Protective layers may include reinforcement, armor, special coatings, etc.

4. Connectors: Connectors are used to connect the fiber optic cable to other devices or cables. They provide a reliable connection and minimize signal loss.

Optical fibers are insulators and are not subject to electromagnetic influences or radiation. They are also resistant to noise and vibration, making fiber optic cable reliable and efficient for transmitting data over long distances. There are no noise and vibration characteristics, as well as electromagnetic and radiation emissions of the fiber optic cable, which is confirmed by the results of measuring physical parameters during the monitoring process in the summer of 2023, the results are in Section 8 of this report and Appendix 13.

Antenna mast structure (AMS) - used for installing antennas and other communication equipment. The mast on which the antennas are mounted is installed on a foundation that ensures the stability of the structure. The location for the AWS is selected at high elevations, in open areas, to ensure maximum coverage of the coverage area and reduce the amount of interference. AMC masts are made of various materials such as steel, concrete or wood. In addition, different types of antennas and radio transmitting devices are installed on the masts, depending on specific needs. (Photo 5.5, 5.6.)

Photo 5.5. Radio transmitting devices on AMS

Photo 5.6. Sampling to assess soil condition

Optical cables are laid in the ground at a depth of 120 cm. Today, there are about fifty different designs of optical cables for all possible installation conditions. Fiber optic cables are distinguished:

1. by fiber material:

- GOF cable (English: glass optic fiber cable);
- POF cable (plastic optic fiber cable);

2. at the place of installation:

- for outdoor installation (in the ground, in the air, under water);
- for indoor installation (inside data centers);

3. according to laying conditions:

- for suspension (cable with Kevlar or rope);
- for hanging on power transmission line supports (cable with lightning protection);
- for laying in the ground (cable armored with iron wires);
- for laying in cable ducts (cable with corrugated metal armor);
- for installation under water (multilayer cable).

Fiber optic cable devices vary depending on the end use of the cable. The main ones:

1. Optical fiber

Optical fiber itself is quite fragile and more vulnerable to damage compared to copper wire. All elements that make up an optical cable protect the optical fiber from all external influences: climatic, mechanical, and so on.

2. Water blocking materials:
   Hydrophobic fillers

These are special petroleum products that behave neutrally (inertly) throughout the life of the optical cable, that is, they do not enter into a chemical reaction either with the optical fiber itself or with other structural elements of the optical cable. The filler itself is located directly inside the optical cable structure.

3. Optical cable sheath

The outer sheath protects the optical cable core from all kinds of external influences and mechanical damage, for example, from the sun, rain. The main material for its manufacture is polyethylene.

The color of optical cables for external installation is predominantly black due to the presence of a carbon black additive (about 3%). Carbon black is an excellent ultraviolet stabilizer, so it prevents the destruction of the polyethylene itself (OK shell) when exposed to the sun (ultraviolet radiation).

Various polymer compounds are also added to polyethylene compositions, thanks to which the cable receives a polymer sheath that is resistant to the spread of combustion.

Fiber optic cables have a lower environmental impact than traditional copper cables because they are made of glass or plastic and are more energy efficient.

The amount of energy required to send a flash of light over a fiber optic cable is significantly less than that required to send electrical signals. Less energy means less carbon footprint, less emissions and greener operations. But along with the advent of new technology, a need arose for the recycling of fiber optic waveguides. Optical cables are classified as industrial waste, therefore, when replacing communications, they must be written off from the organization’s balance sheet and recycled. Unlike cables, optical fibers are processed separately and in compliance with safety measures. There are no non-ferrous metals in optical wires. The composition includes a core, fiberglass rod, plastic modules, hydrophobic filler, and polyethylene insulation. With this structure, processing and disposal work is car-

ried out on special equipment with full provision of personal protective equipment for workers.

Antenna mast structures play an important role in human life. They are widely used in the field of telecommunications, cellular communications, the Internet, and television.

For the safe operation of antenna-mast structures, metal structures must ensure the safety of their operation, for which purpose engineering surveys are carried out before design and manufacture: the surface of the AMS placement, methods and methods of fastening, corrosion, and negative impacts are studied. All loads on the structure of antennas, masts and towers affect the choice of material, design type, size, methods of fastening and installation.

All antenna mast structures must meet the following operational requirements:

- operating temperature - -40°C - + 60°C
- air humidity - 25-99%
- antennas and masts should be located no higher than 2000 m above sea level
- wind load - no more than 40 m/s
- Possibility of year-round use

Traditionally, antenna mast structures are made from low-carbon steel, from steel and cast iron castings, from low-alloy, open-hearth, boiling and Bessemer steels, and aluminum alloys. Different structural elements, due to their purpose, can be made of different metals, but their mechanical and chemical properties should not differ greatly from each other for their high-quality connection and fastening to each other.

All surfaces of the antenna-mast structure are treated with a primer or polymer composition to provide anti-corrosion protection. Also, in the process of manufacturing a metal structure, the method of hot-dip galvanizing steel can be used. This is due to year-round outdoor use, when the structure is exposed to precipitation and winds.

Structurally, antennas, masts and towers are structures up to 350 m high. An antenna-mast structure can consist of several tiers (belts, sections), each of which can reach a length of 11 m. The lower chords are geometrically a truncated pyramid, the subsequent ones are a triangle.

The main structural elements of the AMS are:

- foundation
- load-bearing metal structure
- stairs and service platforms
- receiving and transmitting devices
- light fence
- lightning protection devices

Depending on the technical and operational characteristics of the AMS, the latter are:

1. telescopic mast structures with a height of 2 to 25 m, consisting of pipes connected to each other (with bolts and washers), which are inserted into each other according to the principle of a television antenna
2. composite masts up to 12 m high, consisting of pipes connected by bushings

3. truss masts up to 90 m high, consisting of steel corner elements or pipes bolted together through flanged connections. To ensure vertical stability, the masts are either secured with guy wires or installed on loaded supports (self-supporting masts).

negative impact on land resources from the operation of fiber optic cable and antenna mast structures, this is confirmed by visual observations during the monitoring period in the summer of 2023 and the results of chemical analysis of soils presented in Table 5.1.

A potentially negative impact occurs during construction and installation work and is caused by disturbance of the soil cover (fertile and plant layers). However, along the entire monitoring route, no land plots that had not been restored to their natural state were found. The land plot completely restores its fertile and vegetative layers the very next year after the disturbance.

5.2. Monitoring of land resources. Monitoring methodology. Soil sampling points

The purpose of land (soil) monitoring is to collect and summarize information on the state of the land fund, changes in soil properties under the influence of the Company's economic activities, assessment and forecast of soil condition in order to develop environmentally sound recommendations for their agricultural use and protection.

Before the start of soil sampling, soil scientists from KAZTECO LLP carried out a visual inspection of the study sites in places where fiber-optic cables and antenna -mast structures were present for the presence of other sources of impact: production or industrial sites, historically contaminated lands, littering of the land with production and consumption waste.

The assessment of the impact of fiber optic cable and antenna mast structures on land resources (soils) was carried out in three stages:

Stage 1 – soil sampling;

Stage 2 – preparation for chemical analysis;

Stage 3 – soil analysis.

Sampling of soils of natural and disturbed composition, their preparation for analysis was carried out in accordance with GOST 17.4.3.01-83 "Nature conservation. Soils. General requirements for sampling. Samples were taken from a depth of 0-20 cm using the envelope method in the amount of 49 samples.

LLP Batysekoproekt Research Institute, accreditation certificate No. KZ.T.05.0903 dated 08/07/2020, to determine the content in the soil: hydrogen ions; chlorides; sulfates; petroleum products; copper; zinc; lead. The results of chemical analysis of soil samples - actual data at the time of monitoring are presented below in Table 5.1.

Table 5.1

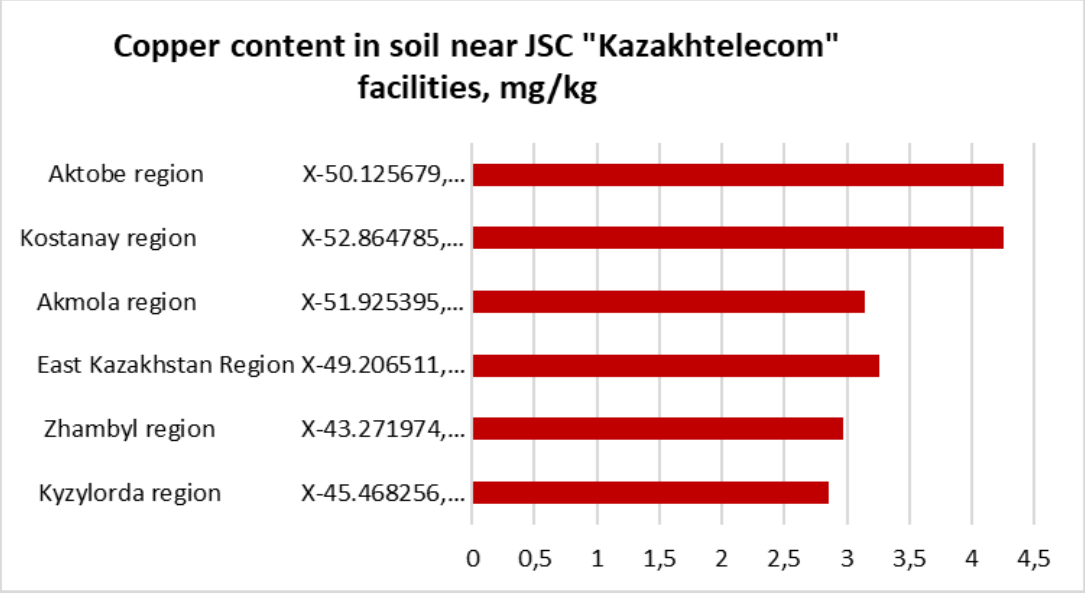
Selection date	Test report	Place selection samples	Indicators, mg/g	Actual results of chemical analysis of soil samples, mg/kg	MPC value mk /kg soil taking into account the background (Clark)	Notes
07/31/2023	08/30/2023	Kyzylorda region Karmakshinsky district, Coordinates: 45.468256, 64.066397	hydrogen pH	7.86	—	Samples were taken in the village of Toretam
			chlorides	5.4/0.19	—	
			sulfates mmol at 100g%	0.76/0.037	—	
			petroleum products	0.045	—	
			copper	2.85	—	
			zinc	5.23	—	
			lead	3.46	—	
07/31/2023	08/30/2023	Jambyl Region Kordai district, Coordinates: 43.271974, 74.203983	hydrogen pH	7.86	—	Samples were taken at MS Taraz
			chlorides	5.8/0.21	—	
			sulfates mmol at 100g%	1.15/0.055	—	
			petroleum products	0.041	—	
			copper	2.97	—	
			zinc	6.14	—	
			lead	2.74	—	
08/04/2023	08/30/2023	East Kazakhstan region Katon-Karagay district Coordinates: 49.206511, 84.403549	hydrogen pH	7.46	—	Samples were taken near Lake Alakol
			chlorides	6.5/0.23	—	
			sulfates mmol at 100g%	0.83/0.040	—	
			petroleum products	0.033	—	
			copper	3.26	—	
			zinc	8.1	—	
			lead	2.93	—	
08/04/2023	08/30/2023	Akmola region Zhaksynsky district, Coordinates: 51.925395,	hydrogen pH	7.51	—	Samples were taken in Kokshetau
			chlorides	2.6/0.092	—	
			sulfates mmol at 100g%	1.22/0.059	—	

Selection date	Test report	Place selection samples	Indicators, mg/g	Actual results of chemical analysis of soil samples, mg/kg	MPC value mk /kg soil taking into account the background (Clark)	Notes
		67.131902	petroleum products	0.035	—	
			copper	3.14	—	
			zinc	7.28	—	
			lead	3.31	—	
08/07/2023	08/30/2023	Kostanay region Denisov district, Coordinates: 52.466527, 61.733273	hydrogen pH	7.47	—	Kostanay
			chlorides	4.8/0.17	—	
			sulfates mmol at 100g%	1.66/0.080	—	
			petroleum products	0.032	—	
			copper	3.71	—	
			zinc	8.48	—	
			lead	4.12	—	
		Kostanay region area Beimbet Mailin, Coordinates: 52.864785, 62.812282	hydrogen pH	7.42	—	
			chlorides	3.6/0.128	—	
			sulfates mmol at 100g%	1.74/0.084	—	
			petroleum products	0.052	—	
			copper	4.26	—	
			zinc	8.77	—	
			lead	3.69	—	
08/07/2023	08/30/2023	Aktobe region Khromtau district, Coordinates: 50.125679, 59.085216	hydrogen pH	7.34	—	Aktobe
			chlorides	3.7/0.131	—	
			sulfates mmol at 100g%	1.25/0.060	—	
			petroleum products	0.04	—	
			copper	4.26	—	
			zinc	7.92	—	

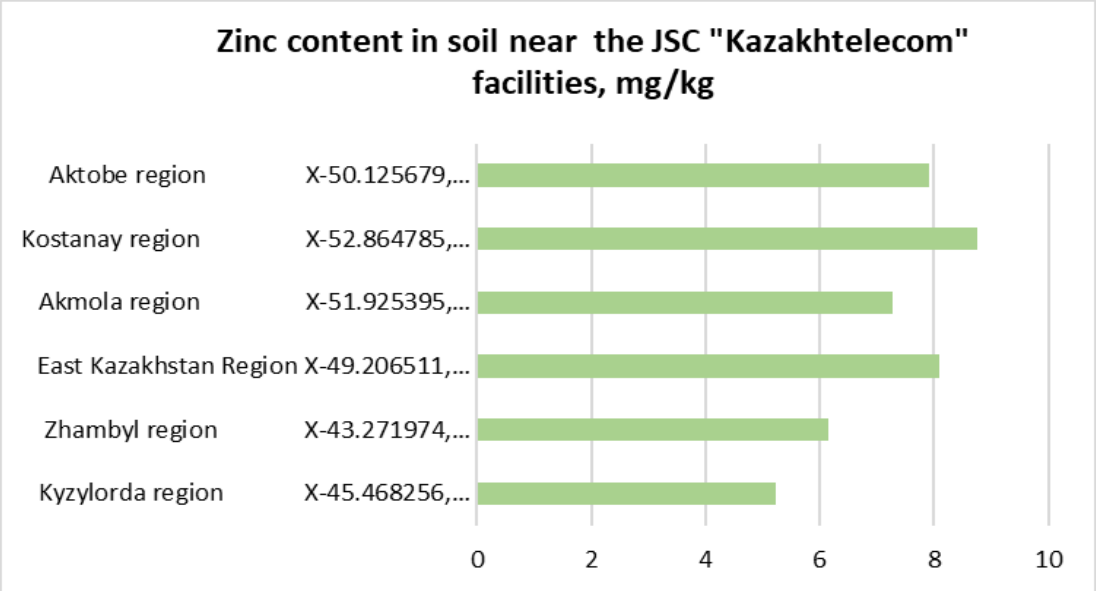
Selection date	Test report	Place selection samples	Indicators, mg/g	Actual results of chemical analysis of soil samples, mg/kg	MPC value mk /kg soil taking into account the background (Clark)	Notes
			lead	4.27	—	

According to the Hygienic standards for the safety of the living environment (Table 5.1. Maximum permissible concentrations (hereinafter - MAC) of chemicals in soil), approved by Order of the Minister of Health of the Republic of Kazakhstan dated April 21, 2021 No. KR (DSM -32. Registered with the Ministry of Justice of the Republic of Kazakhstan April 22, 2021 No. 22595), there are no standards for maximum permissible concentrations in soil for pollutants analyzed during the monitoring period for comparison. (soil sample analysis protocols are presented in Appendix 11).

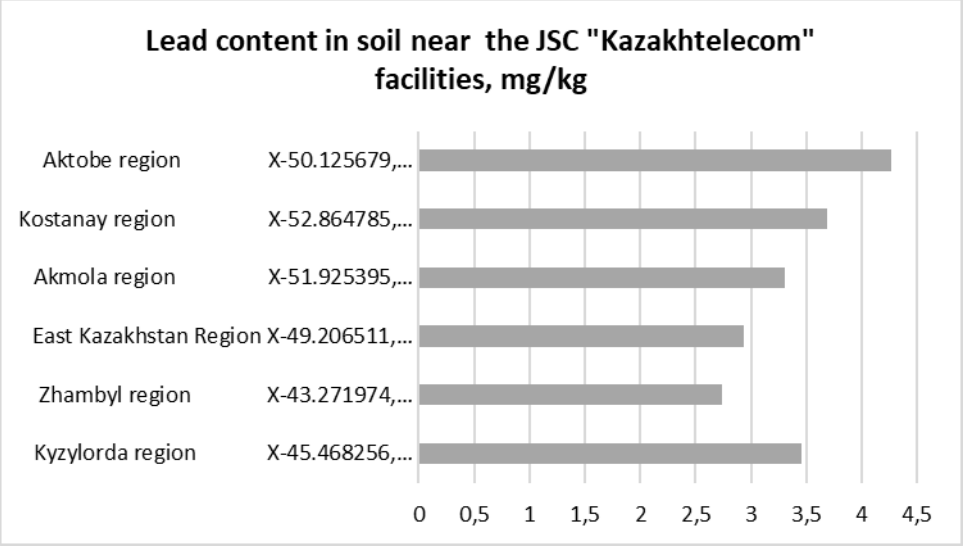
For substances for which there is no maximum permissible concentration in the soil, the values of the actually detected concentrations of substances in the soil are taken as basic values. In the future, to assess the impact of the Company's activities on the chemical composition of soils, the basic values will be used in a comparative analysis with the results of subsequent monitoring.



Pic. 5.2. Copper content (Cu), when analyzed for the content of heavy metals in the soil near the facilities of JSC "Kazakhtelecom"



Pic. 5.3. Zinc content (Zn), when analyzed for the content of heavy metals in the soil near the facilities of JSC “Kazakhtelecom”



Pic. 5.4. Lead content (Pb), when analyzed for the content of heavy metals in the soil near the facilities of JSC “Kazakhtelecom”

Photo 5.7. Soil and vegetation cover above a fiber optic cable laid at a depth of 120cm

In disturbed areas, during installation and dismantling work, the reclamation of destroyed lands is always carried out with the obligatory sowing of perennial grasses. As can be seen in photo 5.7. the soil and vegetation cover above the underground cable has been completely restored and does not differ from the appearance of nearby areas.

6. CHARACTERISTICS OF WATER RESOURCES OF KAZAKHSTAN

The territory of Kazakhstan is divided into eight water basins: Aral-SyrDarya water basin, Balkhash-Alakol water basin, Irtysh water basin, Ural-Caspian water basin, Ishim water basin, Nura-Sarysu water basin, Shu- Talas water basin and Tobol-Turgai water management basin.

.

Pic. 6.1. Map diagram of the location of telecommunication networks in relation to water basins

Kazakhstan's water resources depend to a large extent on river and lake runoff. Glaciers are the main source of food for the rivers of Kazakhstan. In total, 2,724 glaciers have been identified in the mountains of Kazakhstan with a total glaciation area of 2,033.3 sq. m. Almost half of the total glaciation area is in the mountains of the Dzhungar Alatau (more than 1 thousand sq. m).

There are 85,022 rivers and temporary watercourses on the territory of Kazakhstan, including 84,694 rivers up to 100 km long, 305 up to 500 km long, 23 rivers over 500-1000 km long.

The Irtysh is the most abundant river in Kazakhstan. Its length within the republic is 1700 km (total length 4248 km). The second largest river in Kazakhstan is the Syrdarya, 1,400 km long within the republic (total 2,219 km).

The main artery of the Lake Balkhash basin is the Ile River, 1001 km long (815 km within Kazakhstan).

The most significant rivers include the Ural, Ishim, Tobol, Ilek, Shu, Torgai, Sarysu, Talas, Nura, Emba and others.

According to the hydrochemical composition, the waters of mountain rivers belong to the hydrocarbonate class; their mineralization varies from 200-300 mg/l during high water to 500-600 mg/l during low water (stable period).

The waters of lowland rivers belong to the sulfate or chloride classes.

In transit rivers of deserts and semi-deserts, water mineralization in the upper reaches is 100-200 mg/l, and in the lower reaches up to 5 thousand mg/l.

There are 48,262 lakes in Kazakhstan, of which 45,248 are small (area less than 1 sq km). There are 296 large lakes (over 10 sq km), and 21 larger than 100 sq km. The latter make up 60% of the water surface of all lakes in Kazakhstan.

There are 2 types of lakes - tectonic and exogenous origin. The Caspian, Aral Seas, Balkhash, Teniz, Alakol, Markakol are located in tectonic depressions.

The total volume of water level in the lakes of Kazakhstan is more than 190 sq km.

The territory of Kazakhstan from the southwest and western part is washed by isolated reservoirs of the Caspian and Aral seas. The Caspian Sea is divided by relief into 3 parts: northern shallow (4-8 m), middle (up to 780 m) and southern deep (over 1 thousand m).

The Aral Sea occupies the depression of the Turan Lowland. The seabed is entirely located in the area of shelf depths, and the water level is rapidly decreasing.

According to the conditions of occurrence, distribution, nutrition, formation of resources, chemical composition, and the nature of the permeability of water-bearing rocks, fractured, fractured-stratal and stratified underground waters are distinguished. The fissure type is common in mountainous and hilly areas. It lies at a depth of 30-50 m in the form of springs with low mineralization (0.1 -0.5 g/l). The strata type is developed in all flat areas, river valleys in the thickness of terrigenous and carbonate rocks.

6.1. Brief description of technological equipment as a source of influence on water resources

According to data provided by the Branch of the Company “Association “Division “Network””, the fiber optic cable crosses the water resources of Kazakhstan and amounts to 805 objects (Appendix 12).

Pollution of surface and groundwater is largely due to environmental pollution in general. Pollutants come from the environment through the natural cycle. From the surface of the earth, together with precipitation, they seep into groundwater and, as a result of the relationship, seep into the horizons of groundwater.

In practice, the Company carries out construction and installation work on fiber optic cables and other telecommunications equipment only after receiving positive opinions from the relevant government agencies in the field of land use, subsoil use, water use, and environmental protection.

Laying fiber optic lines through water obstacles (along the bottom) is the most reliable and modern method of providing communications to objects separated by water bodies. Laying fiber-optic lines through water obstacles is carried out mainly by horizontal directional drilling, which is carried out in three stages: drilling a pilot well, its sequential expansion and pulling the pipeline for the fiber-optic cable. Using this method, **the puncture length can reach 1500 m without reaching the surface.**

Horizontal directional drilling provides a solution to many environmental problems associated with underground infrastructure:

1. Minimization of excavation: HDD allows you to build underground communications, bypassing excavation and keeping the landscape intact.
2. Reduced risk of pollution: Since HDD does not require the excavation of large volumes of soil, the risk of environmental pollution is significantly reduced.
3. Preservation of natural vegetation: HDD preserves vegetation and natural ecosystems, which promotes biodiversity.
4. Less traffic congestion: HDD minimizes traffic congestion, which also reduces emissions of harmful substances into the atmosphere.

Today the Company has 805 facilities throughout Kazakhstan that cross water bodies. (the list of objects is attached in Appendix 12)

Pic. 6.1. Cable layout when crossing water bodies

Pic. 6.2. Bridge on the Syrdarya River

In Pic. 6.1. shows the layout of the cable for crossing water bodies. As can be seen in Pic 6.1, the cable runs under water in the ground, there is no direct contact of the cable with water. If the reservoir has a wide channel, the cable is tied to the bridge, as in Pic. 6.2, at the intersection with the river. Syrdarya.

The possibility of groundwater contamination during the operation of telecommunications equipment is also excluded, the fiber-optic cable inside the soil cover is laid no deeper than 120 cm, powerful insulation of the cable to ensure durability and protection from external factors, also isolates the external environment from internal influences. As mentioned above, protective layers include reinforcement, armor, special coatings, etc.

During the period of field research in the summer of 2023, chemical analysis of samples from surface reservoirs was carried out at the intersection of rivers with a fiber optic cable laid under their bottom, to obtain reliable information about the current state, forecast the consequences of exposure, as well as develop recommendations for the prevention and elimination of negative impacts, if any. will be discovered.

6.2. Monitoring of water resources. Monitoring methodology. Water sampling points

Water is the most valuable natural resource. It plays an exceptional role in metabolic processes that form the basis of life. The growth of cities, the rapid development of industry, the intensification of agriculture, a significant expansion of irrigated areas, improvement of cultural and living conditions and a number of other factors are increasingly complicating the problems of water supply. The shortage of clean fresh water is already becoming a global problem. The ever-increasing needs of industry and agriculture for water are forcing all countries and scientists around the world to look for various means to solve this problem. At the present stage, the following directions for the rational use of water resources are being determined: more complete use and expanded reproduction of fresh water resources; development of new technological processes to prevent pollution of water bodies and minimize the consumption of fresh water.

Monitoring of water resources is understood as a system of continuous (current) and comprehensive monitoring of the state of water resources, control and accounting of quantitative and qualitative characteristics over time, interdependent impacts and changes in consumer properties, as well as a system for forecasting conservation and development in different modes of use.

The object of monitoring is to assess the quality and level of pollution of water resources as a necessary condition for making scientifically based decisions on the effectiveness of environmental measures.

The main objectives of monitoring are:

- timely identification and forecasting of the development of negative processes affecting the quality of water in water bodies and their condition, development and implementation of measures to prevent the negative consequences of these processes;
- assessment of the effectiveness of ongoing measures to protect water bodies;
- information support for management in the field of use and protection of water bodies, including for the purposes of state control and supervision over the use and protection of water bodies.

At the Company's facilities, monitoring of water resources was carried out at 5 water bodies: on the river. Syrdarya in Karmakshinsky district of Kyzylorda region; on the river Shu in Kordai district, Zhambyl region; on the river Naryn in Katon-Karagay district, East Kazakhstan region; on the river Ayat in the Beimbet Mailin area, Kostanay region; on the river Zhaman Kayrakty in Zhaksynsky district, Akmola region. The quality of MAC water was assessed according to the regulatory document “On approval of Hygienic standards for safety indicators of household, drinking and cultural and domestic water use” dated November 24, 2022 No. KR DSM-138. Surface water quality standards “On approval of a unified system for classifying water quality in water bodies” dated November 9, 2016 No. 151.

The water sampling process included the following steps:

1. Preparation of equipment: checking samplers, sample collection bottles for cleanliness and sterility in order to prevent contamination of the sample to ensure the reliability of the results.
2. Selection of sampling location: the sampling location corresponded to the intersection of the cable with the water body. Sampling was carried out in running water.
3. Sampling: water was collected by filling a container while immersing it in water at an angle of 45 degrees. In this case, it was necessary to prevent air from entering the container. Water was taken at a depth of 30 cm in the direction against the current. After filling, the container (bottle) was tightly closed.
4. Labeling and storage of the sample: The bottle containing the water sample was labeled with the date, time and location of sampling. The sample was stored in a cool, dark place until it was transferred to the testing laboratory.

The results of the actual concentrations of pollutants in water bodies at the time of the research are presented in Table 6.1.

Table 6.1.

Results of monitoring the condition of surface water bodies at the intersection with the facilities of JSC Kazakhtelecom

Selection date	Test report	Sampling location	The name of indicators	Norm according to ND	Factual data (summer 2023)	Background data for the 1st half of the year [3]			Notes (reservoir quality class)
						2023	2022	2021	
31.07-25.08.2023	08/30/2023	Karmakshinsky district, Kyzylorda region , Syrdarya river	Hydrogen ion concentration	6.5-8.5	**8.05**	6.9 - 8.6	6.4-8.2	7.5-7.9	(4th grade) Syrdarya river Zhosaly
			Suspended solids	Not normal.	**5.9**				
			Bicarbonate ion concentration	Not normal.	**207.4**				
			Chloride ion concentration	300	**235.9**				
			Sulfate ion concentration	100	**171.3**	380	412	461.7	
			Phosphate ion concentration	Not normal.	**0.062**				
			Ammonium salt concentration	0.5	**0.205**				
			Nitrite ion concentration	0.08	**0.02**				
			Nitrate ion concentration	40	**1.29**				
			Calcium concentration	180	**25.27**				
			Magnesium concentration	50	**46.2**	39	36,568	34.1	
			Concentration of	0.05	**0.007**				

Selection date	Test report	Sampling location	The name of indicators	Norm according to ND	Factual data (summer 2023)	Background data for the 1st half of the year [3]			Notes (reservoir quality class)
						2023	2022	2021	
			petroleum products						
			Phenol concentration	0.001	**<0.0005**				
			Concentration of surfactants	Not normal.	**<0.025**				
			Surfactant concentration	Not normal.	**<0.015**				
			Iron concentration	Not normal.	**0.08**				
			Solid content	Not normal.	**975**				
			Total hardness concentration	Not normal.	**5.1**				
31.07-25.08.2023	08/30/2023	Kordai district, Zhambyl region r. Shu	Hydrogen ion concentration	6.5-8.5	**7.89**	7.80 – 8.25	7.55 – 8.2	7.50– 7.95	(not standard-ized >3rd grade) r.Shu
			Suspended solids	Not normal.	**6**				
			Bicarbonate ion concentration	Not normal.	**244**				
			Chloride ion concentration	300	**256.3**				
			Sulfate ion concentration	100	**182.4**				
			Phosphate ion concentration	Not normal.	**0.054**				

Selection date	Test report	Sampling location	The name of indicators	Norm according to ND	Factual data (summer 2023)	Background data for the 1st half of the year [3]			Notes (reservoir quality class)
						2023	2022	2021	
			Ammonium salt concentration	0.5	**0.185**				S. D. Kunaeva v. Kaynar
			Nitrite ion concentration	0.08	**0.025**				
			Nitrate ion concentration	40	**1.42**				
			Calcium concentration	180	**30.45**				
			Magnesium concentration	50	**42.15**	24.72	24.7	31.2	
			Concentration of petroleum products	0.05	**0.006**				
			Phenol concentration	0.001	**<0.0005**	0.0012	0.0012	0.0014	
			Concentration of surfactants	Not normal.	**<0.025**				
			Iron concentration	Not normal.	**0.074**				
			Solid content	Not normal.	**980**				
04.08-25.08.2023	08/30/2023	Katon-Karagay district, East Kazakhstan region , Naryn river	Hydrogen ion concentration	6.5-8.5	**7.72**	7.29 – 8.55	7.35 – 8.34	7.46 – 8.24	(from 3rd grade → 1st grade) r. Ertis
			Suspended solids	Not normal.	**10.2**				
			Bicarbonate ion	Not	**219.6**				

Selection date	Test report	Sampling location	The name of indicators	Norm according to ND	Factual data (summer 2023)	Background data for the 1st half of the year [3]			Notes (reservoir quality class)
						2023	2022	2021	
			concentration	normal.					With. Glubokoe
			Chloride ion concentration	300	**271.2**				
			Sulfate ion concentration	100	**154.8**				
			Phosphate ion concentration	Not normal.	**0.082**				
			Ammonium salt concentration	0.5	**0.236**	0.51			
			Nitrite ion concentration	0.08	**0.035**				
			Nitrate ion concentration	40	**1.74**				
			Calcium concentration	180	**45.16**				
			Magnesium concentration	50	**38.79**	25.4	27.7	28.1	
			Concentration of petroleum products	0.05	**0.008**				
			Phenol concentration	0.001	**<0.0005**				
			Concentration of surfactants	Not normal.	**<0.025**				
			Iron concentration	Not normal.	**0.01**				

Selection date	Test report	Sampling location	The name of indicators	Norm according to ND	Factual data (summer 2023)	Background data for the 1st half of the year [3]			Notes (reservoir quality class)
						2023	2022	2021	
			Solid content	Not normal.	**940**				
07.08-25.08.2023	08/30/2023	Beimbet Mailin area, Kostanay region, Ayat river	Hydrogen ion concentration	6.5-8.5	**7.64**				(4th grade) Akkarga village
			Suspended solids	Not normal.	**9.8**				
			Bicarbonate ion concentration	Not normal.	**244**				
			Chloride ion concentration	300	**282**	2757.533	2971.4	2543.5	
			Sulfate ion concentration	100	**128.6**				
			Phosphate ion concentration	Not normal.	**0.087**				
			Ammonium salt concentration	0.5	**0.212**				
			Nitrite ion concentration	0.08	**0.029**				
			Nitrate ion concentration	40	**1.66**				
			Calcium concentration	180	**452.36**	339.9	348,533	322.6	
			Magnesium concentration	50	**45.69**	410.8	382.225	349.5	
			Concentration of petroleum	0.05	**0.006**				

Selection date	Test report	Sampling location	The name of indicators	Norm according to ND	Factual data (summer 2023)	Background data for the 1st half of the year [3]			Notes (reservoir quality class)
						2023	2022	2021	
			products						
			Phenol concentration	0.001	**<0.0005**				
			Concentration of surfactants	Not normal.	**<0.025**				
			Iron concentration	Not normal.	**0.088**				
			Solid content	Not normal.	**970**				
08/04/2023	08/30/2023	Zhaksyn district, Akmola region. R. Zhaman Kay-rakty	Hydrogen ion concentration	6.5-8.5	**7.89**	7.11-9.09	7.212-9.33	7.27-8.99	(4th grade), Turgenevka station
			Suspended solids	Not normal.	**6**				
			Bicarbonate ion concentration	Not normal.	**244**				
			Chloride ion concentration	300	**256.3**				
			Sulfate ion concentration	100	**182.4**				
			Phosphate ion concentration	Not normal.	**0.054**				
			Ammonium salt concentration	0.5	**0.185**				
			Nitrite ion concentration	0.08	**0.025**				
			Nitrate ion	40	**1.42**				

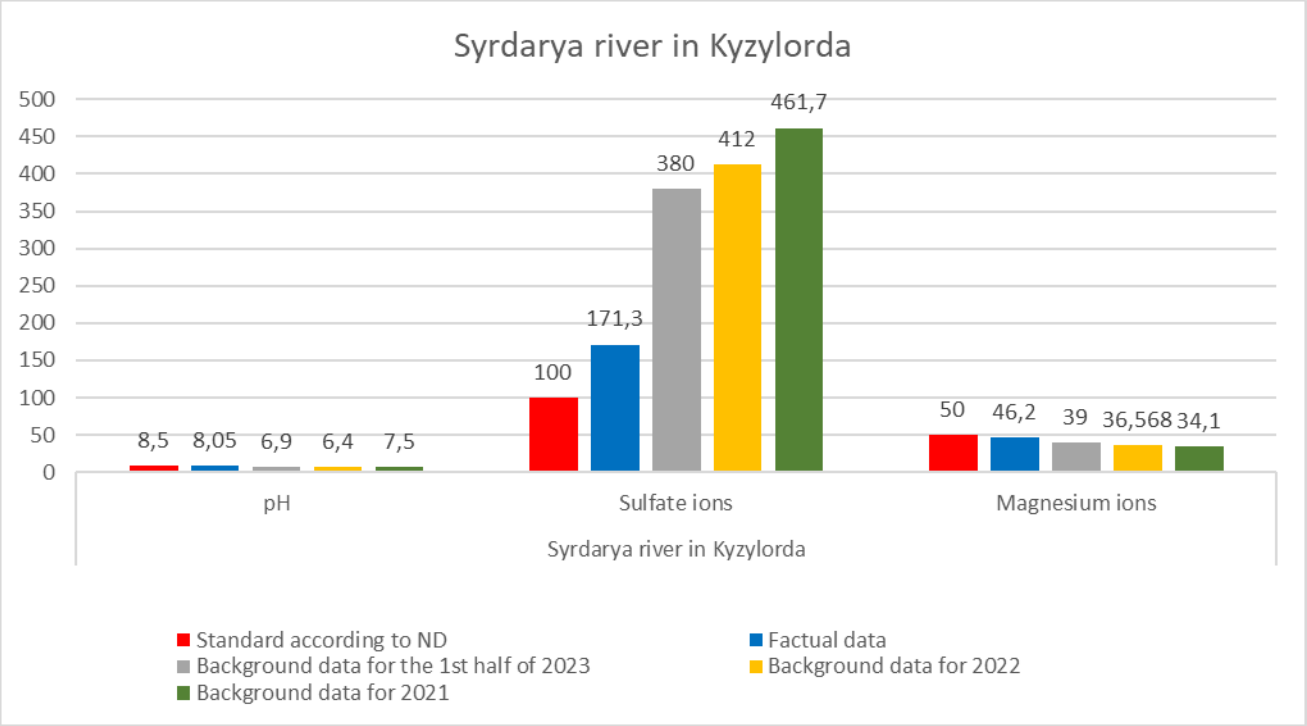
Selection date	Test report	Sampling location	The name of indicators	Norm according to ND	Factual data (summer 2023)	Background data for the 1st half of the year [3]			Notes (reservoir quality class)
						2023	2022	2021	
			concentration						
			Calcium concentration	180	**30.45**				
			Magnesium concentration	50	**42.15**	36,984	32.1	37.04	
			Concentration of petroleum products	0.05	**0.006**				
			Phenol concentration	0.001	**<0.0005**				
			Concentration of surfactants	Not normal.	**<0.025**				
			Iron concentration	Not normal.	**0.074**				
			Solid content	Not normal.	**980**				

6.2.1. Analysis of the water monitoring results of JSC Kazakhtelecom in comparison with the monitoring results of the RSE Kazhydromet

Indicators of the monitoring results of water sampled in places where the Company's telecommunications equipment is present in 2023 in comparison with the data of 3 years of monitoring by the RSE "Kazhydromet" [3] show that the ion-salt composition of water from the studied rivers has not changed. Rivers are the most mobile and easily changeable part of the hydrosphere; its geochemical composition can vary over a fairly wide range, depending on climatic, weather conditions and many other physical factors.

According to the Unified Classification, water quality is assessed from class 5 - more polluted to class 1 - cleaner.

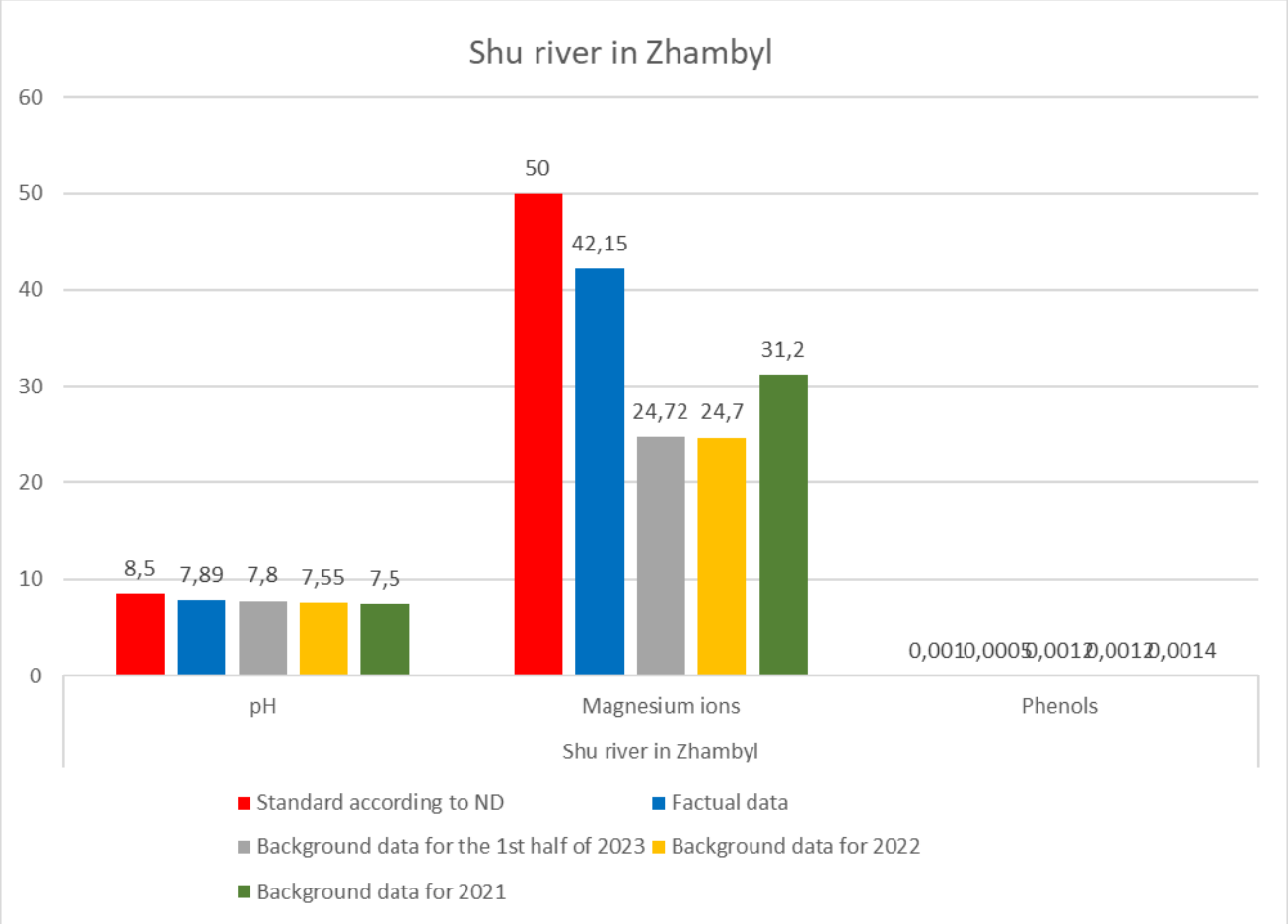
River surface water quality Syrdarya in the Kyzylorda region, according to 3-year observations, does not change significantly, the quality class remains at the 4th class level. The main pollutant in water bodies of the Kyzylorda region is magnesium. Exceeding quality standards for these indicators is mainly due to the agricultural activities of the region.



Pic. 6.3. Comparison of the results of chemical analysis of water samples from the river. Syrdarya in Kyzylorda region. with multi-year background values [3]

The quality of surface waters of rivers and streams in the Zhambyl region does not change significantly during the analyzed period; according to the classification, the Shu River belongs to class 3 (not standardized).

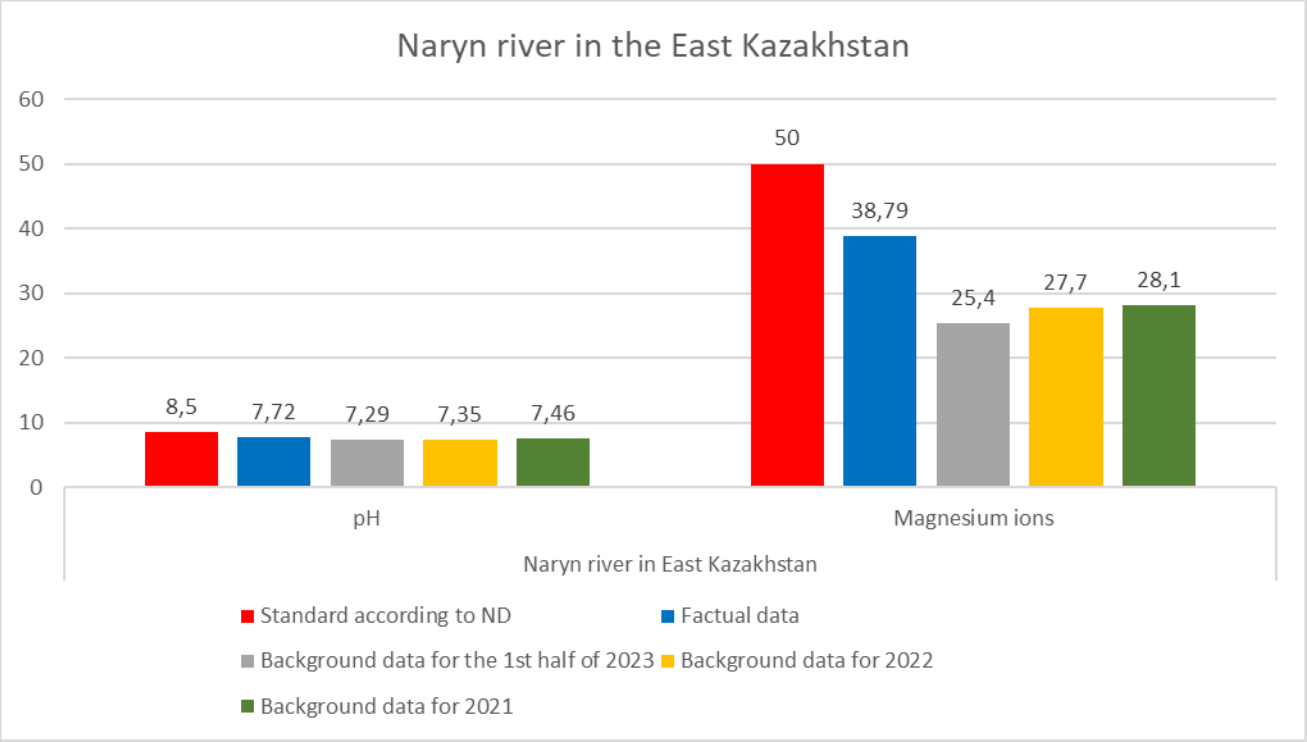
The main pollutants in water bodies in the Zhambyl region are sulfates, phenols, magnesium and suspended substances. No cases of high (HV) and extremely high pollution (EHP) were detected in the Zhambyl region.



Pic. 6.4. Comparison of the results of chemical analysis of water samples from the river. Shu in Zhambyl region. with multi-year background values [3]

The quality of water in the rivers of the East Kazakhstan region and the Abay region has improved over the period 2021-2023, in particular in the Ertis river it moved from class 3 to class 1.

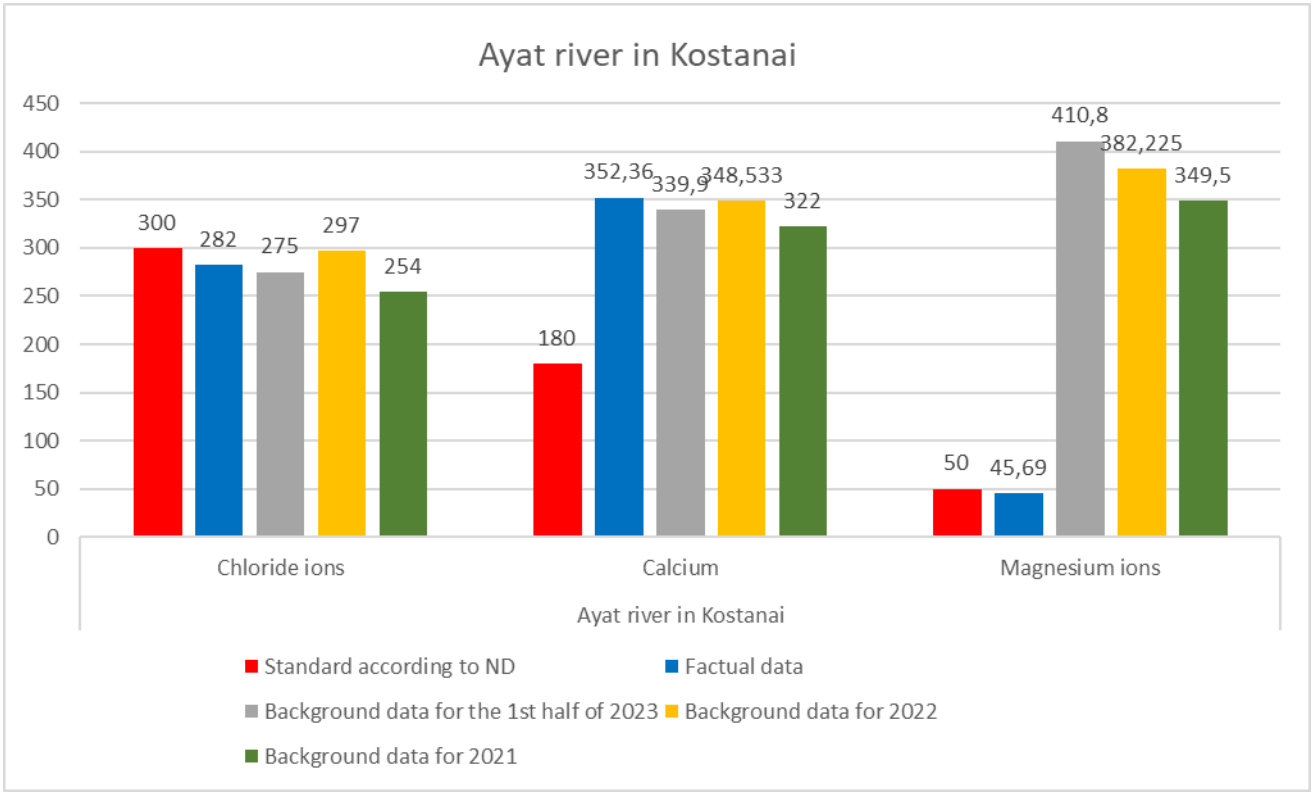
The main pollutants in water bodies of the East Kazakhstan region are ammonium ion, nitrites, phosphates, manganese, cadmium, magnesium, suspended substances. Exceeding quality standards for these indicators is mainly due to technological production emissions from numerous enterprises, as well as the influence of the soil composition characteristic of the area.



Pic. 6.5. Comparison of the results of chemical analysis of water samples from the river. Naryn in East Kazakhstan region. with multi-year background values [3]

The quality class of surface water in rivers and reservoirs of the Kostanay region did not change significantly during the study period.

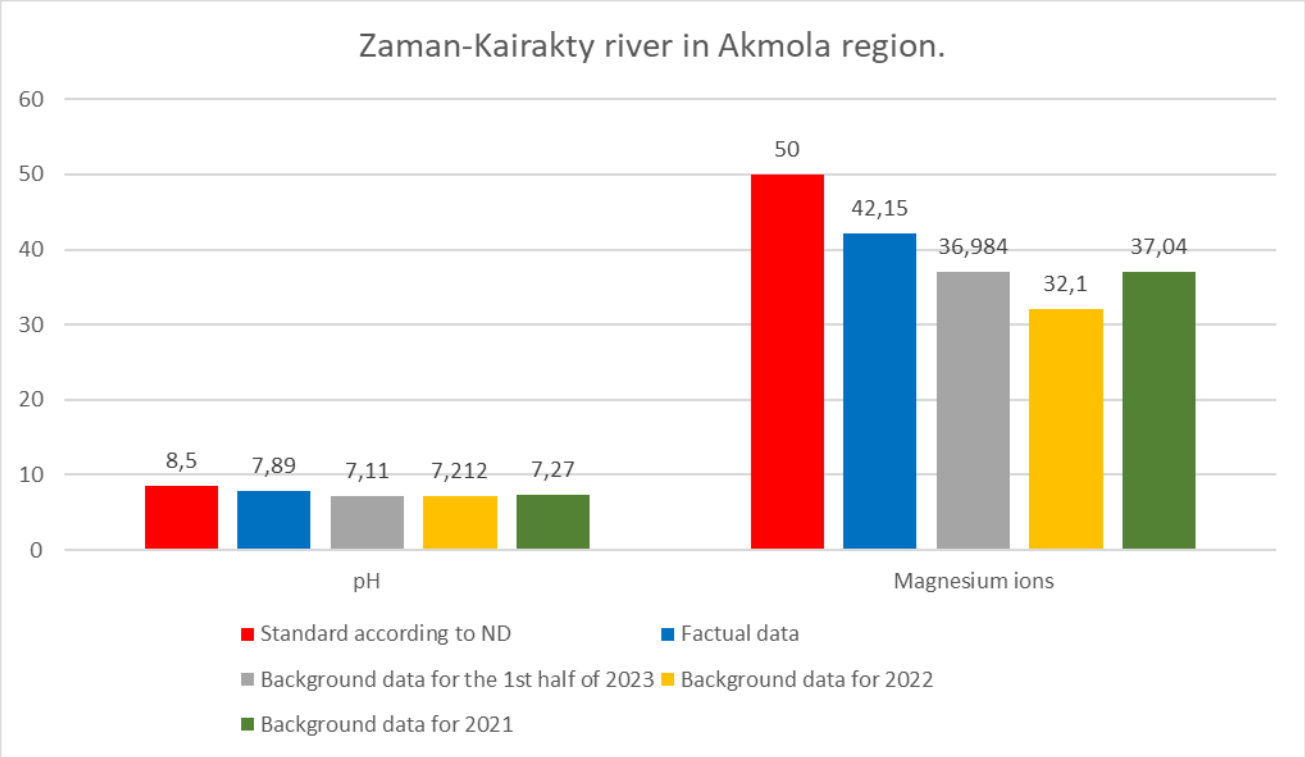
The water quality class of the Ayat River moved from above class 5 to class 4 - improved.



Pic. 6.6. Comparison of the results of chemical analysis of water samples from the river. Ayat in Kostanay region. with multi-year background values [3]

The quality of surface water in the rivers Yesil, Akbulak, Sarybulak, Nura, Bettibulak, Zhabai, Aksu, Kylshykty, Shagalaly, Astana Reservoir. And the Nura-Yesil channel, according to the Unified Classification System, did not change significantly during the analyzed period.

The main pollutants in water bodies of the Akmola region are magnesium, COD, mineralization, chlorides, manganese, total iron, total phosphorus, BOD 5. Exceeding quality standards for these indicators is mainly typical for urban wastewater discharges in conditions of a large population



Pic. 6.7. Comparison of the results of chemical analysis of water samples from the river. Zhaman -Kairakty in Akmola region. with multi-year background values [3]

Based on the results of monitoring of surface water bodies for 2023, it is clear that the actual values for water quality indicators do not exceed the norms for ND. Exceeding the standards is observed in the Syrdarya River in the Kyzylorda region - for sulfate ions and in the Ayat River in the Kostanay region - for calcium by approximately 2 times. These excesses are recorded in the annual monitoring reports of the RSE “Kazhydromet” [3]. This is the result of the naturally specific salt content of water bodies.

Therefore, exceeding the indicator values is in no way related to the Company’s activities.

According to the results of a chemical analysis of water from reservoirs in places where the fiber-optic cable was installed and visual observations, it follows that the fiber-optic cable does not have a negative impact on water resources, nor does it interfere with the movement and reproduction of river living organisms.

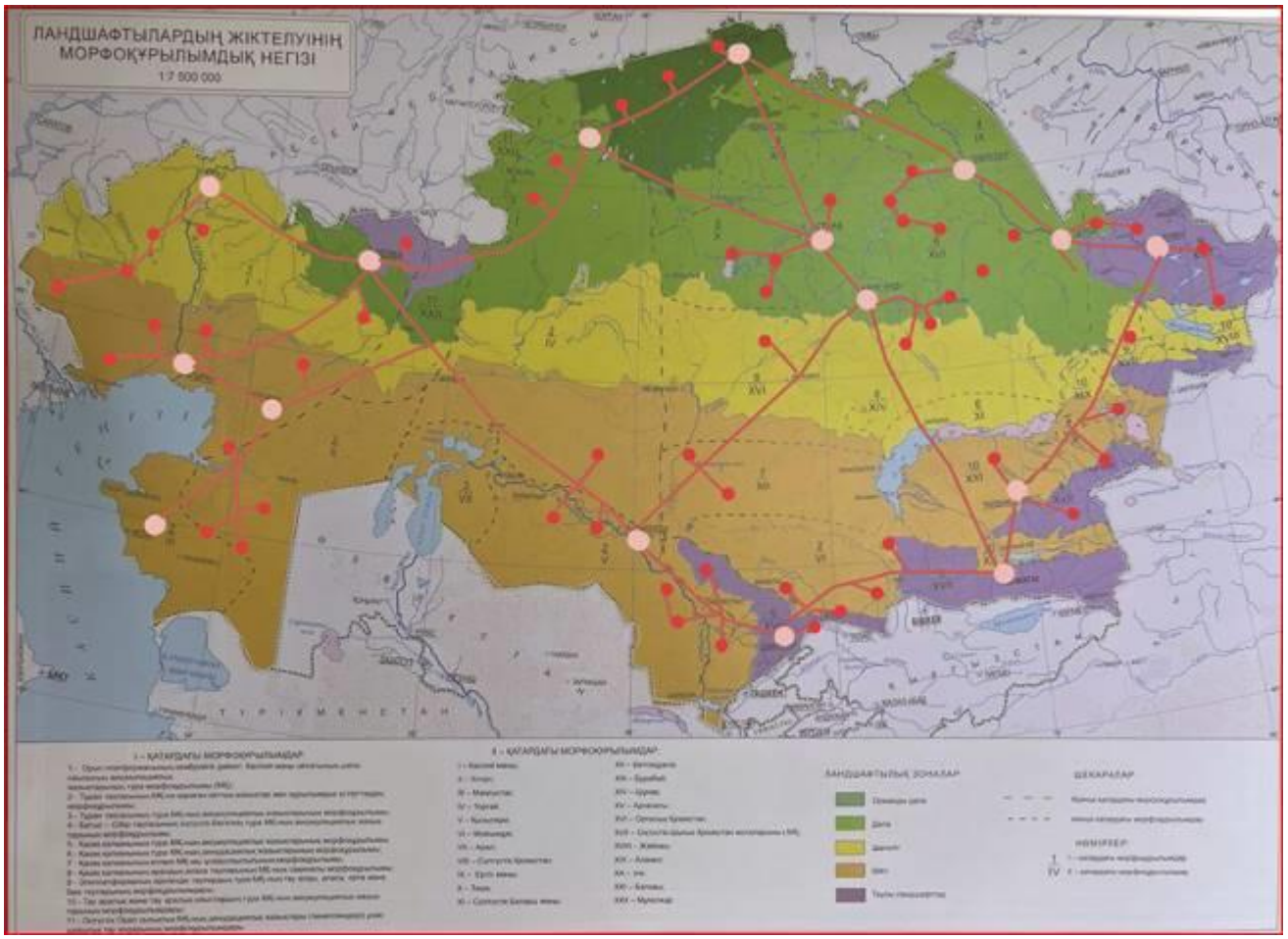
7. CHARACTERISTICS OF BIODIVERSITY OF THE REGIONS OF KAZAKHSTAN

Biodiversity is the sum of all living things and the ecosystems in which they live. First and foremost, it represents the interaction between living organisms and the natural environment—dynamics that are essential to the survival of the planet [4] .

Landscape Kazakhstan is different wide variety: mountains V central, eastern and southeastern parts of the country, deserts and semi-deserts in the southwest, desert steppes combined with forest-steppe in the north. At the same time, the forest cover is small, it occupies about 5% territories and amounts to 13.3 million ha [2].

Significant Part territories, recognized forest lands, Not covered forest, what is confirmed by satellite data, according to which the forests of Kazakhstan occupy only 4% from general area countries or eleven, 6 million ha. Shrubs And protective plantings occupy near 1.2 million ha, a main woody breeds – conifers, soft-leaved and hardwood covered only 3.3 million ha. Saxaulniki occupy more 6 million ha.

Almost all forests are V state property and protected with restrictionson cutting down.



Pic. 7.1. Morphostructural basis for the classification of landscapes in the locations of the telecommunications network of JSC Kazakhtelecom

The national report of the Republic of Kazakhstan on biodiversity noted the depletion of biodiversity and degradation of ecosystems on 66% of the Republic's area. The decline in biodiversity components is caused primarily by anthropogenic impacts. The following are indicated as the main threats: 1) desertification; 2) economic activity; 3) pollution of the natural environment; 4) natural disasters; 5) small areas of protected ecosystems, especially in the zone of

deserts and steppes, during plowing and overgrazing ; 6) forest fires and illegal logging on the territory of the state forest fund.

To these reasons it is necessary to add the violation of the hydrological regime of rivers and lakes due to flow regulation, the destruction of vulnerable ecosystems during the spontaneous organization of tourism, the uncontrolled collection of medicinal, food and ornamental plants; influence of introduced species (biological pollution), excessive extraction of biological resources, poaching.

The flora of Kazakhstan includes more than 13 thousand species, including more 5754 kind higher vascular plants, near 5000 – mushrooms, 485 – lichens, more 2000 – algae, near 500 – bryophytes [2]. Most full inventory species exposed higher plants and mushrooms Among plants 14% species are endemics of various ranks, including many relics.

In the semi-desert and desert zones, there are 250 species of plants adapted to the harsh conditions of deserts, the main one among them is saxaul. There are 2 main species in Kazakhstan – white and black (Zaisan) saxaul. The first grows where there are sands, the second - on salt marshes. This low tree has powerful roots, with which it anchors the sands and stands as a barrier in the path of dust storms, protecting fertile lands, rivers and canals from the destructive invasion of sands. In Kazakhstan, saxaul logging has been prohibited since 2015 until December 31, 2023 (Order of the Chairman of the Forestry and Wildlife Committee of the Ministry of Agriculture of the Republic of Kazakhstan dated 08/13/2015 No. 211 “On the prohibition of logging in saxaul plantations in areas of the state forest fund”).

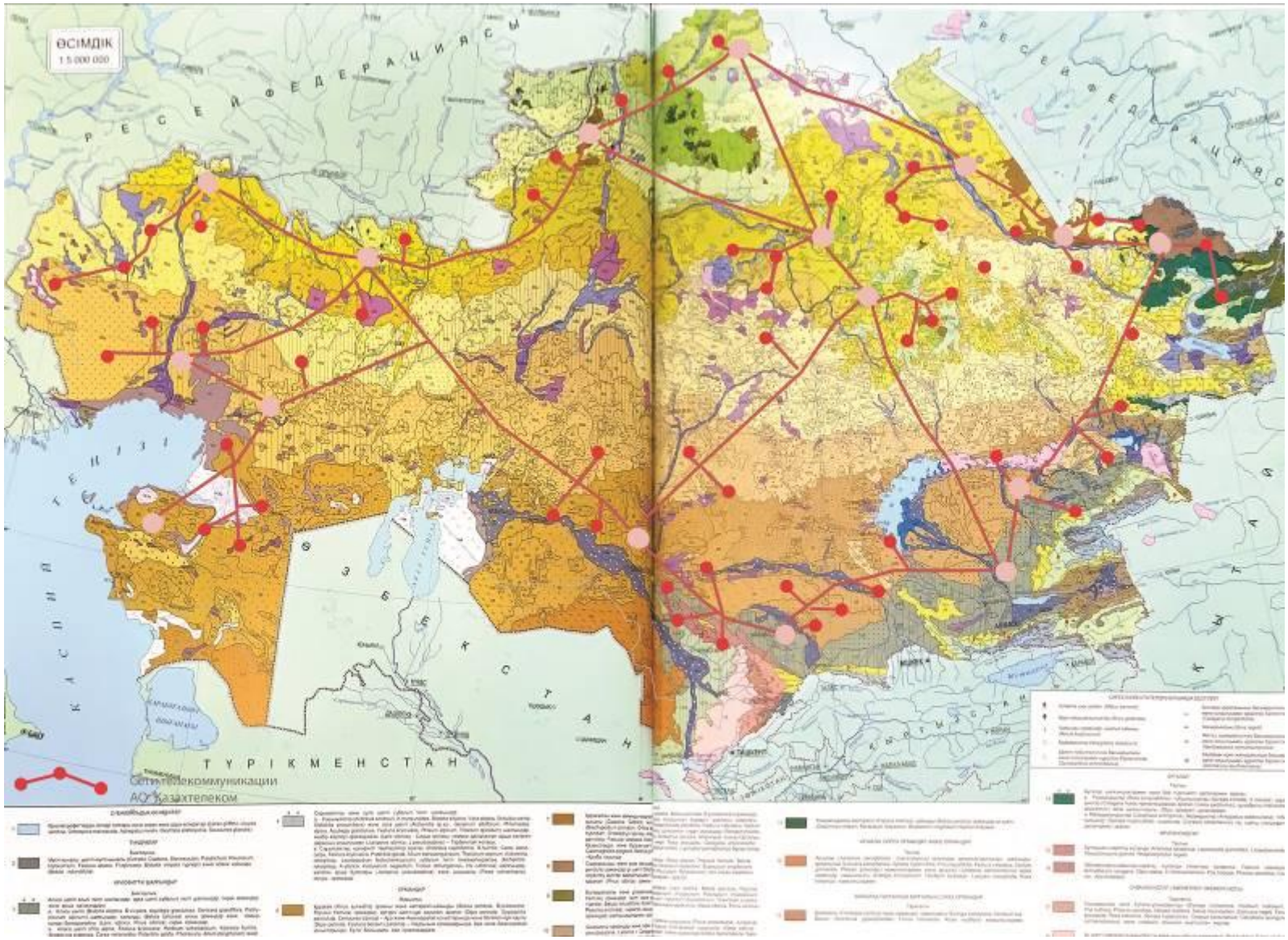
In the steppe zone, feather grass, fescue, speedwell, bedstraw and relict grasses grow - Siberian feather grass, chickweed and multi-rooted onion. The flora of swamps, river floodplains and estuaries are represented by 63 plant species.

In the mountain forests of Kazakhstan there are cedar, pine, larch, fir, Siberian spruce and Schrenk spruce, as well as apple, apricot, ash formations (in the Tien Shan, in the Dzungarian Alatau).

About 600 species of rare and endangered plants grow on the territory of the Republic: 287 species of flowering plants, 2 species of gymnosperms, 3 species of pteridophytes, 3 species of mosses, 1 species of lichen, 10 species of mushrooms. And Ostrovsky magnificent, Pskem onion, Keller's pyrethrum, Ili barberry, Ledebur almond are found only in nature reserves and reserves

Harvesting of plants of economic importance, such as soap root, Rhodiola rosea, etc., is prohibited or limited.

In order to legislatively regulate all issues related to the protection, reproduction and use of flora resources, the Law of the Republic of Kazakhstan on flora was adopted in 2022.”



Pic. 7.2. Zones of plant communities in places where telecommunication equipment of JSC Kazakhtelecom is present

The fauna of Kazakhstan is represented by 835 species of vertebrate animals, including mammals - 178, birds - 489 (of which 396 are nesting), reptiles - 49, amphibians - 12, fish - 104 and cyclostomes - 3 species [2]. Some species are used for commercial and economic purposes. The objects of hunting are 34 species of mammals and 59 species of birds.

Due to human activity, most representatives of the fauna that lived on the territory of Kazakhstan found themselves in a vulnerable position, and many iconic local species ended up on the pages of the Red Book. Among mammals, 31 species are listed in the Red Book (gallard, wild ass, argali, cheetah, snow leopard, Tien Shan brown bear, sand cat, European mink, etc.), among birds - 49 species (common flamingo, Dalmatian and pink pelican, black and white stork, whooper swan, golden eagle, bustard, pheasant, snowcock, etc.), of reptiles - 8 species, as well as some species of amphibians and fish.

In 2022, the Center for the Reproduction of the Houbara Bustard in the Turkestan Region released 8.9 thousand individuals of the Houbara Bustard into their natural habitat in the territories of Mangistau, Kyzylorda, Almaty and Turkestan regions. Since 2009, 47.6 thousand individuals of houbara bustards have been released into the wild of Kazakhstan. According to practical observations, the survival rate of birds in the natural environment is more than 50%.

The Republic is also working to preserve and restore the numbers of rare and endangered species of ungulates. Thus, there is a positive trend in the increase in the number of saigas - 1318.0 thousand individuals versus 842 thousand in 2021. There are 3 saiga populations in Kazakhstan: Betpak-dala, Ural and Ustyurt. Their habitat also extends to neighboring regions of Uzbekistan and the Russian Federation.

Thanks to the measures taken in the Republic to preserve rare and endangered species of animals, the number of some wild animals (argali, gazelle) is increasing every year.

Despite the measures taken to protect saigas, cases of poaching do not stop. In this regard, the MENR, the Ministry of Internal Affairs and the National Security Committee are conducting an environmental campaign “Saiga” to combat poaching.

Fisheries Fund

The country's fishery fund includes a significant water area of the Caspian and Aral seas, lakes Zaisan, Balkash, the Alakol system of lakes (Alakol, Sasykkol, Koshkarkol), Bukhtarma, Kapshagai, Shardara reservoirs and other reservoirs of international, republican and local importance.

The total area of reservoirs excluding the Caspian Sea is about 5 million hectares. The total fish catch in the reservoirs of the Republic in 1965 was 111.9 thousand tons. From 1990 to 2004, there was a decrease in fish catch volumes from 80.9 thousand tons to 36.6 thousand tons.

In order to preserve fish resources, the activities of the authorized body are focused on:

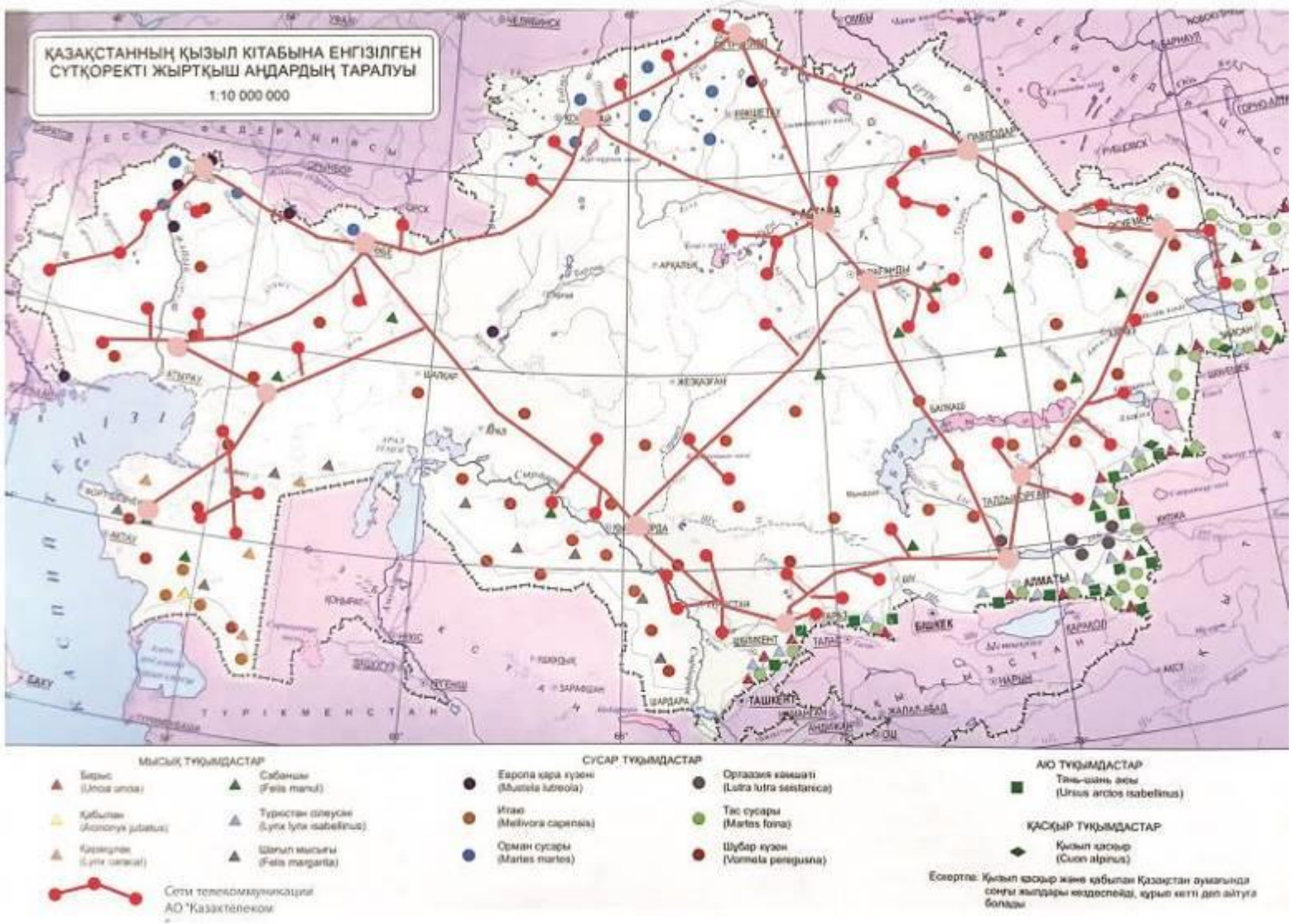
- reproduction of fish resources of reservoirs;

- development of commercial fish farming (aquaculture);

- protection, regulation and sustainable use of fish resources.

In 2022, state fish farms raised and released into the country's fishery reservoirs 91.2 million juveniles of valuable fish species (fry of sturgeon, whitefish larvae, fingerlings and two-year-old carp and herbivorous fish species (grass carp, silver carp).

Decree of the Government of the Republic of Kazakhstan dated October 31, 2006 No. 1034 approved the list of rare and endangered species of animals: mammals - 40, birds - 57, reptiles - 10, amphibians - 3, aquatic animals - 18, annelids - 2, mollusks - 6, crustaceans – 1, arachnids – 2, insects – 85.



Pic. 7.3. Distribution of mammals and predators listed in the Red Book in places where telecommunication equipment of JSC Kazakhtelecom is present

Specially protected natural areas of Kazakhstan. Expanding the areas of specially protected natural areas is the most effective way to ensure the preservation of valuable natural complexes, biodiversity, restoration and improvement of the biopotential of the natural environment.

The total area of specially protected natural areas (SPNA) in the Republic is 29.3 million hectares or 10.8% of the country's area. At the same time, protected areas with the status of a legal entity occupy 7.9 million hectares or 2.9% of the country's area [9] .

In the total area occupied by objects of specially protected natural areas of republican significance, the share of state natural reserves is 6.6%, state national natural parks - 11.1%, state natural reserves - 12.7%. The main areas of specially protected natural areas are occupied by state protected areas - 46.0% and state natural reserves - 23.87%.

The largest number of state natural reserves are located in Karaganda (6), Turkestan (5), Zhetisu (4), North Kazakhstan (4), Almaty (3), East Kazakhstan (3), Akmola (3), Zhambyl (3), West Kazakhstan (3) and Kostanay (3) regions.

State natural protected areas are allocated in Atyrau (the northern part of the Caspian Sea), Zhambyl, Mangistau and Turkestan regions.

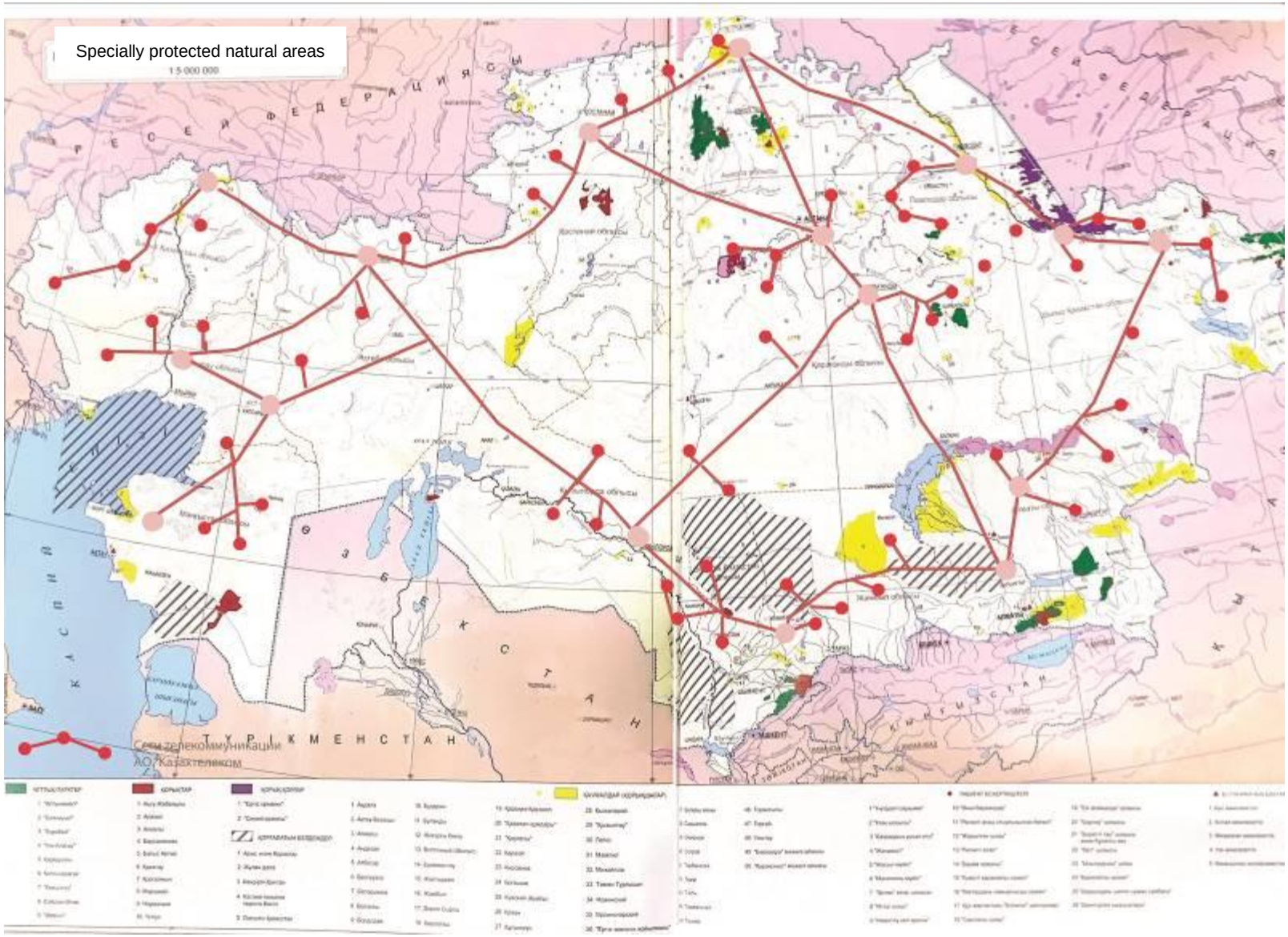
Natural monuments occupy relatively small areas in size. Their main quantity is allocated in the North Kazakhstan, Akmola, Almaty regions.

Botanical gardens are located in the city of Almaty (Main Botanical Garden of the Institute of Botany and Phytointroduction), Almaty (Ili Botanical Garden), East Kazakhstan (Altai Botanical Garden, Ridder), Karaganda (Zhezkazgan Botanical Garden, Zhezkazgan) and Mangistau (Mangyshlak experimental botanical garden, Aktau) regions and Astana (Astana Botanical Garden).

In addition, specially protected natural areas of local importance have been created in the regions, the development of which is one of the urgent tasks of nature conservation in the regions of the Republic.

In order to preserve the Ural population of saigas, Government Decree No. 330 of May 25, 2022 created the state natural reserve "Bokeyorda" with a total area of 343.04 thousand hectares and the Ashyozeksky state nature reserve in the West Kazakhstan region with a total area of 314.5 thousand hectares. Also, in 2022, the territory of the Andasai State Nature Reserve in the Zhambyl region was expanded by 2,415.8 thousand hectares.

The telecommunications network of Kazakhteleom JSC does not run through the territory of existing protected areas and the study of these territories was not included in the field work route for 2023.



Pic. 7.4. Specially protected natural areas in places where the telecommunications network of JSC Kazakhtelecom is present»

The territory where the Company's telecommunications equipment network is located has a unique set of landscape complexes (Fig. 7.1.): from deserts before highlands And ecosystems internal seas. At this arid and sub-humid lands occupy more than 75% of the territory of the Republic of Kazakhstan. They contain more than 40% of the species composition of all biological diversity.

monitoring (subsections 4.1.; 5.2.; 6.2.) was carried out according to the schedule and route of field research in 6 regions: Kyzylorda, Turkestan, Zhamybl, Almaty, East Kazakhstan, Pavlodar, Akmola, Kostanay, Aktobe.

Qualitative and quantitative indicators of diversity were studied from stock materials before the start of field work. Monitoring was carried out in accordance with the requirements of the document " Guidelines for the management and conservation of biodiversity of JSC "Kazakhtelecom " approved by the Order of the Company.

7.1. Brief description of technological equipment as a source of influence on flora

To assess the impact of the Company's activities on the flora, the state of the floristic composition was determined in comparison with stock data.

To study the diversity of vegetation, botanical (test) sites were established. For forest vegetation, the accepted site size is 400 m2 (20-100 m - x 20 m), steppe vegetation - 1 (10 x 10 m), swamp m2 (1 x 1 m). The main condition for placing a trial site is its location within the same association. (Pic. 7.5.).

Pic.7.5. Area of steppe vegetation. (Aral district, Kyzylorda region Coordinates: 47.047371, 61.484276)

Pic. 7.6. Altai district, East Kazakhstan region Coordinates: 49.692209, 84.337025

Before the start of field work, stock materials were studied and Table H-1 from Appendix A of the Biodiversity Guide was filled out; this report is presented in the Appendix in Table H-1 " Taxonomic composition of plant diversity in the study areas."

Species found on sample plots during field research are indicated in column 5 of the table.

Each plant in the list is written with a double name (genus and species). For each species, its layered position, height (in cm), projective cover (based on the percentage of area occupied by the projection of above-ground parts of plants), abundance on the Drude scale (using the average distances between specimens of the species), phenophase (vegetation stage) and vitality are indicated (degree of development or suppression of the species).

Signs of the structure of plant communities are described, the main attention was paid to species composition, layering (vertical division) and mosaic (horizontal heterogeneity).

In steppe landscapes, the dominant position is occupied by turfy narrow-leaved grasses: fescue, feather grass, grass grass, bluegrass, thin-legged grasses, to which are mixed many species of monocotyledonous and dicotyledonous plants that make up the forbs, a number of species of wormwood subshrubs (Fig. 7.6) and steppe shrubs of the genera: caragana, spirea, bobovnik.

Pic. 7.7. Artemisia subshrub

Pic. 7.8. Altai district, East Kazakhstan region Coordinates: 49.692209, 84.337025

The low species richness of the flora in the expansion areas is explained by harsh living conditions. The surveyed low mountains are characterized by xeromorphic habitats and the absence of vertical zonation.

After conducting a study on the site, samples of plants growing in places where the fiber optic cable passed, as well as away from it within a radius of 100 meters, were selected. Plant samples were identified in the same places where soil samples were taken. During a visual inspection of the sample plots, the disappearance of a certain plant species or degradation of existing vegetation, or changes in flowering were not recorded. The quantitative and qualitative composition corresponds to stock data.

Based on the research conducted, we can conclude that fiber optic communication cables (FOCC) do not have a negative effect on vegetation.

First, fiber optic cables do not emit heat or radiation that could damage plants. Secondly, the cable is usually laid at a sufficient depth so as not to affect the root system of most plants.

7.2. Brief description of production technology and technological equipment in terms of impact on fauna and characteristics of sources of influence

Monitoring of the animal world in the area of influence of the Company's activities is carried out in order to timely identify, prevent and eliminate the consequences of negative processes and phenomena for the conservation of biological diversity.

The study of the species diversity of different groups of animals: aquatic invertebrates, insects, amphibians, reptiles, birds, mammals living in the territory of Kazakhstan, before the start of field work, was carried out using stock materials. The results are presented in Appendix A. Table H-2 " Taxonomic composition of the diversity of terrestrial invertebrates"; N-3 " Taxonomic composition of the diversity of terrestrial vertebrates"; N-4 " Taxonomic composition of the diversity of aquatic invertebrates and fish"

In the table, individuals discovered during field research are noted in column 5.

During monitoring studies of fauna in July-August 2023, for an objective assessment of the Company's impact, ants were selected as indicators, as the most common species of insect representatives.

Ants are a very important link in biogeocenoses. Most species of ants living in Kazakhstan are very useful: they improve the composition of the soil by mixing, loosening and fertilizing it, protect wild and cultivated plants from harmful insects, and are pollinators and seed carriers.

The genus *Formica* (where there are about 160 species, and the total number of taxa including subspecies is 343) is divided into several (7 - 8) subgenera, groups of species and complexes of species (arranged in order of relationship): **Coptoformica ("** F. execta group "), **Formica s.str. (**F.rufa group", "F.microgyna group", " F.exectoides group "), **Serviformica** ("F.fusca group ", " F.neogates group "), **Neoformica** , "F. obtusopilosa group ", **Raptiformica** (" F.sanguinea group ").

The division of more than 160 species and subspecies into groups is done differently by different taxonomists (Creighton, 1950; Wilson & Brown, 1955; Buren, 1968; Smith, DR 1979; Tinaut, 1990). Modern views on systematics are interpreted from Smith DR (1979), Agosti (1994) and Bolton (1995). In this case, groups of species are used, which is not consistent with the rules of zoological nomenclature. The groups of species in this interpretation are: *exsecta, fusca, microgyna, neogagates, pallidefulva, rufa* and *sanguinea* [12]

Ants feed on beetles, caterpillars and other harmful insects. They love proteins and carbohydrates, so they eat the juice of aphids, protect colonies of aphids near the anthill and breed them on nearby plants, feed on the liquid that they secrete by hitting them on the sides. Ants are also saprophytes. Do not give up milk or honey dew. Ants can feed each other: some swallow nectar, others come and get food from their mouths, this phenomenon - tropholaxis, is of great importance in the social structure and hierarchy of ants.

Descriptions of biotopes

During the monitoring period, 3 sites were selected in different biotopes (in the steppe and forest-steppe zones) that differed in anthropogenic impact, from which objects were collected. The classification of vegetation of the biotope was described using generally accepted methods.

Methodology: Counts were carried out in the summer during the daytime (in the time range from 8.00 to 22.00). All anthills that could be found along the fiber-optic cable were taken into account. (Pic.7.8.)

Methodology: The study was carried out according to generally accepted methods (Dlussky G.M.), the determination of species composition was done using the linear method:

Linear - when clearly visible nests with external superstructures, large entrances to the nest or large emissions of soil are taken *into* account. When counting, along a pre-planned route, all nests that were found in a certain strip of the same width were counted. To count the nests, we took a strip 2 meters wide (Pic. 7.5.).

Study of ant nutrition in discovered anthills

During the monitoring, ants inhabiting certain anthills were observed. Thanks to this, it was possible to determine the composition and amount of food delivered by them to the anthill during this time.

A study of the feeding habits of ants revealed that all ants feed on aphid honeydew; many species prefer small-sized insects as food, since they are entomophages.

A study of the sanitary condition of the forest near anthills showed that ants prevent pests from spreading. They pay special attention to those parasites that are experiencing outbreaks of mass reproduction, thereby regulating their numbers.

As a result of our research, we conclude: Ants of the genus Formica, known for their sensitivity to anthropogenic stress, play an important role in ecosystems, performing functions such as the decomposition of organic material and maintaining soil fertility. Their presence and prosperity serve as an indicator of a healthy ecosystem.

During the monitoring period in the summer of 2023, about 15 anthills were discovered, an important observation that ants of the genus Formica continue to live near the site where the fiber-optic communication cable (FOCC) was laid. The presence of healthy ant colonies near the cable indicates that the cable is not negatively impacting these beneficial soil inhabitants.

According to factory specifications, the cable does not emit heat, electromagnetic or radio emissions, which is confirmed by the results of field observations, therefore it does not cause harm to ants or other soil organisms. In addition, the depth of cable laying eliminates surface influence on living organisms, in particular ants.

7.3. Characteristics of production technology and technological equipment from the point of view of the influence of the biological system of reservoirs

Environmental monitoring of the biodiversity of reservoirs was carried out in places where the fiber-optic cable was laid under the bottom of the reservoir.

Monitoring the state of the ichthyofauna is one of the indicators that allows us to determine the general state of the natural reproducibility of a reservoir. The number of fish populations in a natural reservoir is not a constant value and is subject to fluctuations. Changes in the number of natural populations of a reservoir largely depend on various factors, which include seasonal changes, the availability of food, hydrochemical indicators, and the influence of anthropogenic factors.

JSC Kazakhtelecom in contact with surface water bodies is the fiber optic cable laid under the bottom of the water bodies. Measurements of the level of electromagnetic radiation from the cable (the only possible negative impact) did not reveal any excess of standards (subsection 8.2.).

7.3.1. Zooplankton in the study area

To study the zooplankton community of Lake Naryn, 3 samples were taken . In the studied samples, zooplakton was represented by 10 taxa, of which rotifers - 3 , cladocerans - 5 , copepods - 2 (Table 7.3.1).

Table 7.3.1.

Species composition of planktonic organisms

Kinds:	
Rotifera - *Rotifera*	*Asplanchna priodonta* Gosse
	Keratella cochlearis Gosse
	Cephalodella sp.
Cladocera - *Cladocera*	*Ceriodaphnia quadrangula* (O.F. Muller)
	Diahanosoma brachurum (Lievin)
	Chydorus sp.
	Bosmina kessleri (Uljanin)
	Sida crystalline (OF Muller)
Copepoda _	*Acanthocyclops nanus* (Sars)
	Diaptomidae sp.

The average number of zooplakton was 16.52 thousand specimens / ^{m3} (Table 7.3.2). The basis of this indicator was formed by crustaceans, among which Daphnia reached the greatest development galeata.

Table 7.3.2

Number (thousand specimens / ^{m3}) and biomass (g/m3) of zooplakton

Index	Rotifera	Cladocera	Copepoda	Total
Number	3.46	9.23	3.83	16.52
Biomass	0.01	1.00	0.01	1.02

The average biomass is 1.02 g/m3 , the basis of the biomass is formed by representatives of Cladocera Diahanosoma brachyurum and Daphnia galeata [96].

According to the average biomass, the zooplankton feeding capacity of the lake is at a moderate (α- mesotrophic) level.

7.3.2. Ichthyofauna in the study area

Hydrological parameters, as a factor influencing the biodiversity of water bodies, were determined at three sampling points (Table 7.3.3)

Table 7.3.3.

Hydrological parameters

No.	Coordinates of sampling points	t ^{0} t^0C	Transparency.m	Color	Bottom soil
1	**2**	**3**	**4**	**5**	**6**
1	49.209416, 84.532807	1 7.4	2	Brownish green	Black silt
2	49.205819, 84.399201	17.2	1.9	Brownish green	Brownish black mud
3	49.210047, 84.368517	1 6.5	2	Brownish green	Brownish black silt with plant debris

During the period of monitoring studies in the summer of 2023, five species of fish were found in the lake: pike, silver crucian carp, carp, roach, and common perch (Table 7.3.4).

Native species include perch and silver carp.

Table 7.3.4.

Species composition of fish

No.	Species composition of fish		Species category	
	Kazakh-Russian gazvanie	Latin Name	Listed in Red Book	Fishing object
1	To adimgi shortan-pike	Esox lucius (Linnaeus,1758)	-	+
2	Taban (bozsha monke) Goldfish	Carrassius auratus (Linnaeus, 1758)*	-	+
3	Sazan-Sazan (carp)	Cyprinus carpio (Linnaeus, 1758)	_	+
4	Torta-Roach	Rutilus rutilos (Linnaeus, 1758)	_	+
5	Kadimgi Alabuga-Okun ordinary	Perca fluviatitilis (Linnaeus, 1758)	_	+

Pike. *Pike (lat. E sox lucius)* is one of the few predatory fish in our waters. A genus of freshwater fish, the only one in the pike family . Pike can reach 1.5 m in length and weigh up to 35 kg (usually up to 1 m and 8 kg). The body is torpedo- shaped, the head is large, and the mouth is wide. The color is variable, depending on the environment: depending on the nature and degree of development of the vegetation, it can be gray-greenish, gray-yellowish, gray-brown, the back is darker, the sides have large brown or olive spots that form transverse stripes. Unpaired fins are yellowish-gray, brown with dark spots; paired ones - orange. The lifespan of individual individuals can reach up to 30 years.

Pic. 7.3.1. Pike from the Naryn River, 08/04/2023

The pike has an elongated arrow-shaped body, a large and long head with a highly elongated snout and a wide mouth. Both jaws protrude far forward, with the lower jaw longer than the upper. On the lower jaw there are fang-shaped teeth, on the upper jaw, as well as on the tongue and some other bones of the oral cavity, there are small teeth, the tips of which are directed backwards. With the help of teeth, the pike only holds the prey, but does not chew it - it swallows it whole.

The pike's eyes are located at the top of its head, which allows it to inspect a large space without turning its head.

Pike leads a predominantly sedentary lifestyle. However, it can hunt not only by lying in wait for prey, but also actively look out for it, for which purpose it periodically moves around a certain territory.

Pike usually spawn in groups, in the shallowest coastal areas of the floodplain. Groups include a female and two to five or more males. Females, having laid eggs, immediately go to deeper places, and males more often remain on the spawning grounds. Swimming slightly away from the departing female, they join another group of spawning fish. Therefore, on spawning grounds there is a slight predominance of males over females. Male pike can take part in reproduction for the first time already at one year of age. Most of them mature at the age of two years. Females mature at two or three years of age. The fatness and fat content of the fish is low.

Pike in the lake Naryn is characterized by slow growth and maturation, low fatness and fat content. Apparently, this is explained by the small volume of the reservoir and lack of nutrition in competition with perch. It is advisable to use pike as an object of recreational fishing in order to regulate the number.

Table 7.3.5.

Basic biological indicators of pike

Options	Body length (without C), mm	Body weight, g	Fat content	Body condition index, according to Fulton
Min.	220	93	0	0.5
Max.	460	858	7	1.4
Average	298.4	267	1.3	0.7
Total quantity	12	12	12	12

Carp (lat. Cyprinus carpio) - a species of freshwater ray-finned fish families carp . Lives in Caspian, Aral seas, lake Balkhash And Kapchagay .

The body shape of the carp is residential and semi-anadromous. The carp lives for a long time - up to 30-35 years, but its growth stops at 7-8 years. There are specimens weighing over 20 kg and more than a meter long.

Pic. 7.3.2. Carp caught from the river. Naryn 08/04/2023

In spring and early summer, carp mainly feeds on young shoots reeds , cattail , egg pods and other aquatic plants, readily eats the eggs of early spawning fish and frogs. In the summer, the diet of the carp changes somewhat; now the basis of nutrition consists of aquatic insects, worms, small snails, egg capsules, molting crayfish, small leeches, etc. It also readily eats invertebrate mollusks zebra mussel , small pearl barley, coils, pond snails . In autumn, it completely abandons plants and switches to small aquatic insects and invertebrates.

Spawns at a temperature of 18-20 °C. Puberty at 2-5 years of life. Fertility is about 1.5 million eggs. Spawning in portions, from April to July. Spawning in fresh and in brackish water , in the coastal zone among vegetation.

Roach. Roach is found throughout Kazakhstan, including in the basins of the Caspian and Aral seas.

The roach differs from the species closest to it in its unserrated pharyngeal teeth located on each side in a single row (5-6 on each side), relatively large scales (40-45 scales in the lateral line), a mouth at the end of the muzzle and the position of the beginning of the dorsal fin above the bases of the abdominal ones.

The back is blackish, with a blue or green tint, the sides and belly are silvery, the dorsal and caudal fins are greenish-gray with a reddish tint, the pectoral fins are yellowish, the abdominal and anal fins are red, the iris is yellow with a red spot. There are also specimens with yellow eyes and fins, golden scales, and a reddish tint on the sides and back.

Pic. 7.3.3. Roach caught from the river. Syrdarya 07/31/2023

It usually lives in flocks in places with weak currents under the protection of snags, hanging trees or aquatic vegetation. At the same time, in a school of medium and small fish there may be single large specimens. Small and medium-sized fish are not shy.

The maximum body length is over 50 cm, and the weight is up to 3 kg, the maximum life expectancy is 21 years.

Table 7.3.6.

Basic biological indicators of roach

Options	Body length (without C), mm	Body weight, g	Fat content	Body condition index, according to Fulton
Min.	198	130	2	1.5
Max.	230	196	1.7	2.4
Average	204	173	1	1.7
Total quantity	5	5	5	5

Perch. River perch or common perch (lat. Perca fluviatilis) is a fish of the genus of freshwater perch of the perch family (Percidae) of the order Perciformes .

River perch is a predatory fish: other freshwater fish occupy a significant proportion in the diet of adult perch .

Рис. 7.3.4. River perch caught from the river. Naryn 08/08/2023

River perch prefers to stick to flat reservoirs; it can be found in rivers , lakes , ponds , reservoirs and even in less brackish areas of the seas .

Spawning of river perch occurs in early spring; the female perch lays eggs in the form of a long (up to 1 m) gelatinous ribbon.

In its appearance and body color, perch is easily distinguished from all our other fish. Its body is quite wide, especially in large perches, and somewhat hunchbacked; the back is dark green, the sides are greenish-yellow, the belly is yellowish; 5-9 transverse dark stripes stretch across the entire body, which make it very colorful; in some cases, these stripes are replaced by dark, irregular spots.

In addition, the caudal fin, anal fin and ventral fins are bright red; The pectoral fins are yellow, the first dorsal fin is gray, with a large black spot at the end, the second is greenish-yellow. The eyes are orange.

With age, the perch darkens, but there are always several stripes running across its body. Perch reaches sizes up to half a meter and weight up to 2 kg.

Perch is a species with high ecological plasticity, capable of inhabiting different types of water bodies, forming various forms that differ from each other in morphological, growth and other population indicators, including sex ratio, even within the same body of water.

Perch is a popular object of recreational fishing and is of great commercial importance in some reservoirs.

Table 7.3.7.

Basic biological indicators of perch

Options	Body length (without C), mm	Body weight, g	Fat content	Body condition index, according to Fulton
Min.	86	14	0.6	1.5
Max.	225	234	3	1.9
Average	180.6	106	1.3	2.3
Total number	25	25	25	25

8. MONITORING OF PHYSICAL IMPACT. MEASUREMENT METHOD. SELECTION POINTS

Physical monitoring is a system of observing the impact of physical processes and phenomena on the environment and on the biodiversity of ecosystems.

The purpose of monitoring physical impacts is to assess the level of harmful physical factors impacted by telecommunications equipment and facilities of Kazakhtelecom JSC, to determine whether they comply with established standards and recommendations.

During the monitoring period in the summer of 2023, measurements of the level of acoustic, vibration and electromagnetic radiation were made with the Ecophysics-110A device.

The physical impact monitoring process includes the following steps:

Preparation for measurements: Checking the device, batteries of the measuring and indicator unit (IMU). Connecting the IMU to the preamplifier and microphone using an extension cable.

Equipment installation: Installing the preamp and microphone on a tripod. Orient the microphone upward using a windshield.

Checking the sensitivity of the measuring path: Immediately before measurements, check the correct operation of the instruments using a calibrator.

Measuring noise levels: Measurements are carried out periodically for 5-10 minutes to establish average values.

Processing of measurement results: After completing the measurements, the received data is entered into a log.

8.1. Characteristics of technological equipment in terms of physical impact

In the course of the activities of Kazakhtelecom JSC, it is the impact of physical factors that is the most likely source of impact on bioecosystems, because It is telecommunications equipment that is a potential source of electromagnetic, vibration-acoustic and radiological impacts.

Noises and vibrations of varying intensity and spectrum are created during the operation of various mechanisms, units, passing vehicles and other devices.

At sites, Компаниitemporary panoise can be caused by vehicles during construction and installation work. The average permissible sound level on roads for various purposes, including local ones, is 73 dB (A). This value depends on a number of factors, including the technical condition of transport, road surface, traffic intensity, time of day, design features of roads, etc.

The company's activities К, measures are taken to minimize noise during operation of equipment, such as technical inspection before starting work, timely repair of vehicles, the use of more advanced equipment, etc., which makes it possible to significantly reduce noise and vibration impacts. At the time of monitoring in the summer of 2023, construction and installation work was not carried out иand it was not possible to assess the degree of influence of this type of impact.

Electromagnetic radiation. A potentially dangerous and harmful factor affecting the biosphere is the impact of electromagnetic fields (EMF), the sources of which are radio transmitting devices and power lines. The terrain where the route passes can also affect the intensity of EMF.

There are no noise and vibration characteristics, as well as electromagnetic and radiation emissions of the fiber optic cable. Optical fibers are insulators and are not subject to electromagnetic influences or radiation. Since communication occurs not due to electrical signals passing through metal wires, but by transmitting signals in light form using a laser or LEDs.

An antenna-mast structure (AMS) is used to place radio-electronic communications equipment (RES) at a height for transmitting and receiving radio waves. RES are a potential source of electromagnetic radiation, and therefore the placement of cellular communication base stations is carried out in strict accordance with the sanitary standards of the Sanitary Rules “Sanitary and Epidemiological Requirements for Radio Engineering Facilities” dated February 28, 2022 No. KR DSM-19, outside residential areas.

8.2. Results of monitoring physical impact factors at the facilities of Kazakhtelecom JSC

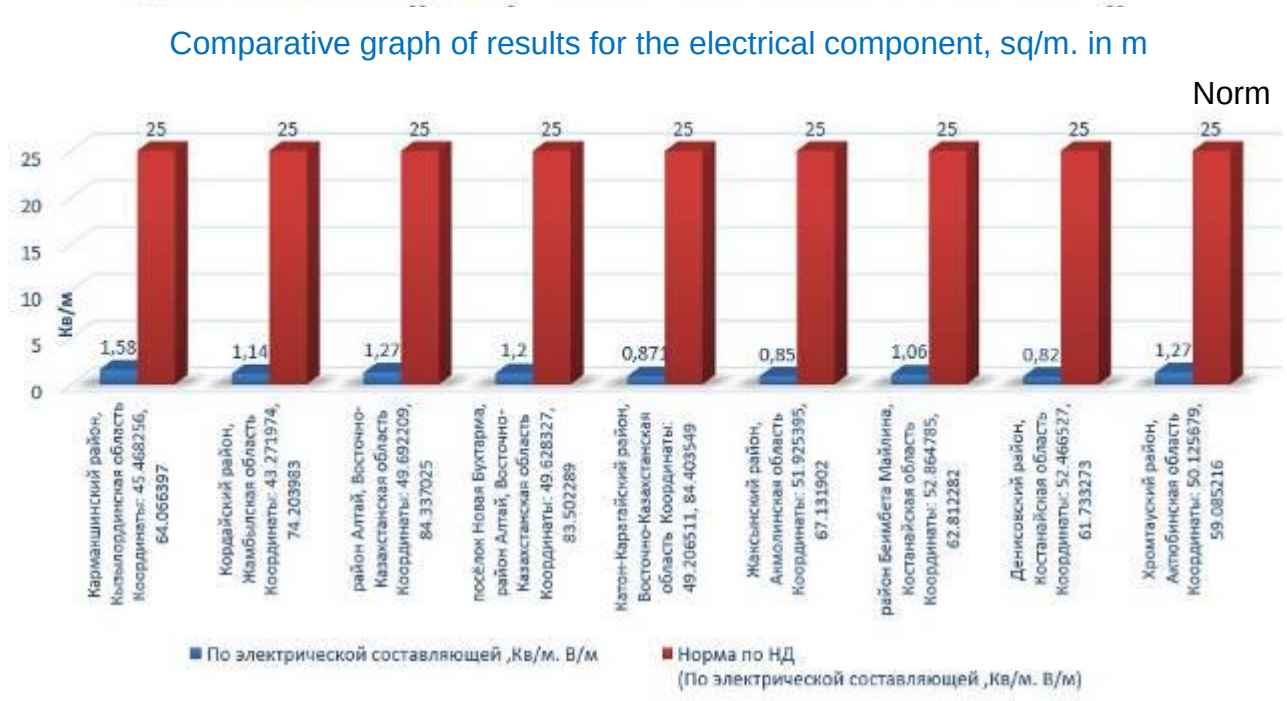
During the monitoring period in the summer of 2023, measurements of the level of electromagnetic fields were carried out along the laying of optical cable lines and near telecommunication equipment at the AMS of Kazakhtelecom JSC, in order to identify excesses of the standards for the electrical component, sq/m. V/m and magnetic component, if any.

Table 8.1.

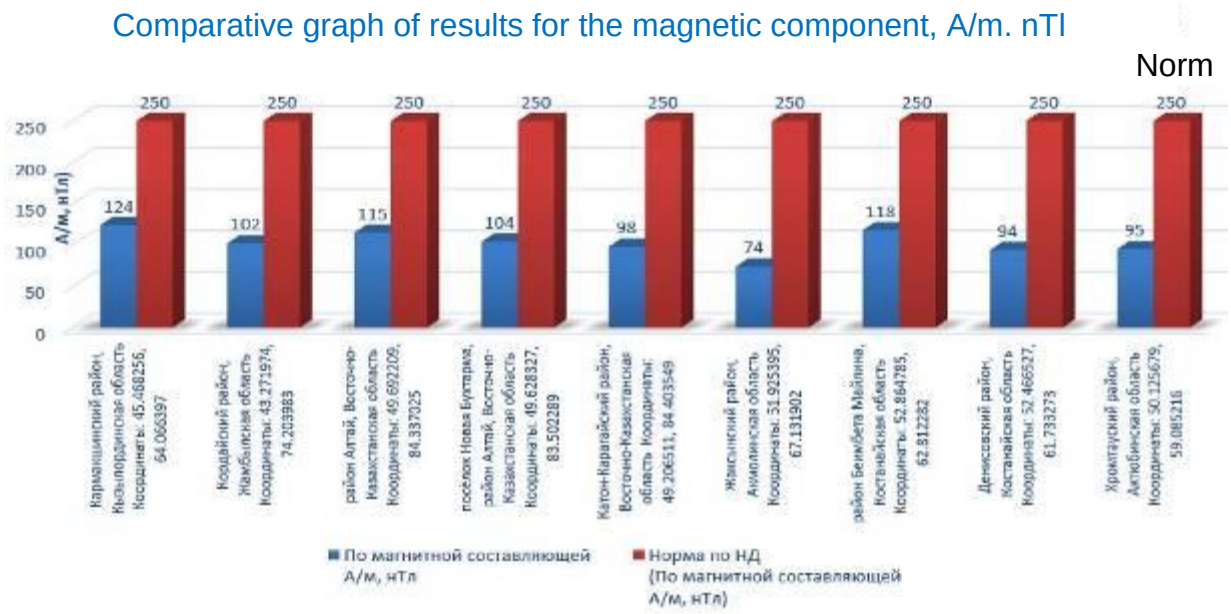
Results of measurements of the level of electromagnetic fields at the locations of telecommunications equipment of JSC "Kazakhtelecom"

Measurement date	Test report	No.	Sampling location	According to the electrical component, sq/m. V/m	Norm according to ND (According to the electrical component, Kv/m. V/m)	By magnetic component A/m, nT	Norm according to ND (According to the magnetic component A/m, nT)
07/29/2023	08/30/2023	1	Karmakshinsky district, Kyzylorda region Coordinates: 45.468256, 64.066397	1.58	25	124	250
07/31/2023	08/30/2023	2	Kordai district, Zhambyl region Coordinates: 43.271974, 74.203983	1.14	25	102	250
08/02/2023	08/30/2023	3	Altai district, East Kazakhstan region Coordinates: 49.692209, 84.337025	1.27	25	115	250
08/02/2023	08/30/2023	4	Novaya Bukhtarma village, Altai district, East Kazakhstan region Coordinates: 49.628327, 83.502289	1.20	25	104.0	250
08/04/2023	08/30/2023	5	Katon-Karagay district, East Kazakhstan region Coordinates: 49.206511, 84.403549	0.871	25	98	250
08/04/2023	08/30/2023	6	Zhaksyn district, Akmola region Coordinates: 51.925395, 67.131902	0.85	25	74	250
08/04/2023	08/30/2023	7	Beimbeta Mailina district, Kostanay region Coordinates: 52.864785, 62.812282	1.06	25	118.0	250
06.08.2023	08/30/2023	8	Denisov district, Kostanay region Coordinates: 52.466527, 61.733273	0.82	25	94	250
06.08.2023	08/30/2023	9	Khromtau district, Aktobe region Coordinates: 50.125679, 59.085216	1.27	25	95	250

Based on the measurement results given in Table 8.1. it can be seen that the actual level of electromagnetic radiation is significantly lower than утвержденных the norms. The telecommunications equipment of JSC Kazakhtelecom does not have any negative electromagnetic impact.



Pic. 8.1. Results of measuring electromagnetic radiation of telecommunication equipment of JSC Kazakhtelecom (electrical component)



Pic. 8.2. Results of measuring electromagnetic radiation of telecommunication equipment of JSC Kazakhtelecom (magnetic component)

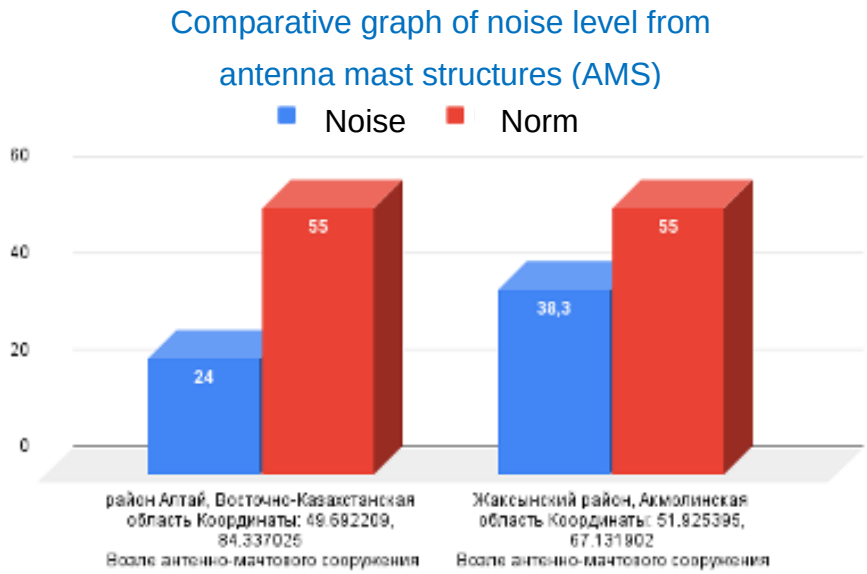
Noise exposure during operation of telecommunications equipment is below the approved noise level standards.

Table 8.2.

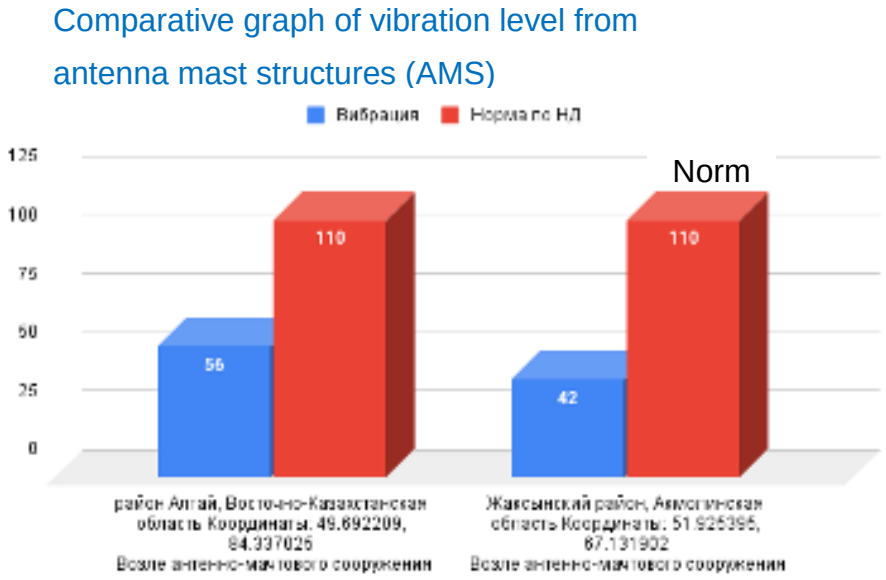
Results of measurements of noise and vibration levels at the locations of the telecommunications JSC Kazakhtelecom

Measurement date	Test report	Name of the object under study	Vibration	Norm according to ND	Noise level	Norm according to ND
07/29/2023	08/30/2023	Altai district, East Kazakhstan region Coordinates: 49.692209, 84.337025 Near the antenna mast structure	56	110	24	55
07/31/2023	08/30/2023	Zhaksyn district, Akmola region Coordinates: 51.925395, 67.131902 Near the antenna mast structure	42	110	38.3	55

Noise and vibration level near the AMS (antenna mast structure) was measured in order to record the level of noise impact from air conditioners used to cool operating telecommunications equipment. The measurement results did not reveal any excess of the standards.



Pic. 8.3. Results of measuring the noise level from the operation of telecommunications equipment at the AMS



Pic. 8.4. Results of measuring the level of vibration from the operation of telecommunications equipment at AMS

Conclusions. Based on the results obtained, we can conclude that the telecommunication equipment of JSC Kazakhtelecom does not have a negative impact on the biodiversity of natural resources. The fiber optic cable and antenna mast structures laid at a depth of 120 cm do not have a physical impact that negatively affects flora and fauna, land and water resources.

The use of modern equipment in all technological processes, the measures taken to minimize the impact of noise, vibration and the virtual absence of powerful sources of electromagnetic radiation at the facilities of JSC Kazakhtelecom allows us to say that physical factors do not have a negative impact on bioecosystems.

9. CONCLUSION

During monitoring and research at the facilities of JSC Kazakhtelecom in July-August 2023, along the route Aktobe → Kyzylorda region → Turkestan region → Zhambyl region → Almaty region → East Kazakhstan region → Pavlodar region → Akmola region → Kostanay region → Aktobe region were applied various methods of biomonitoring, including route survey of plant communities, study of living conditions of insects, amphibians, reptiles, ichthyofauna and plankton (Section 7).

Mmonitoring included a visual inspection of the territory where telecommunication equipment of JSC Kazakhtelecom is located (except for equipment in populated areas), the level of physical impact factors in places of potential negative impact was measured, soil samples, water from rivers and lakes were collected and analyzed (Section 8).

The research results showed that Kthe company's telecommunications equipment does not have a negative impact on the environment. This is confirmed by the absence of anomalies in the development of plants and animals in the areas where the equipment is located. In comparison with background indicators [3], the concentrations of pollutants did not differ.

JSC Kazakhtelecom, striving to minimize the impact of its activities on the environment, demonstrates in practice the ability to operate without having a negative impact on the environment.

Biodiversity conservation is a key factor for sustainable development. Biodiversity plays an important role in maintaining ecological balance and promoting well-being. Therefore, every organization, especially those whose activities may have an impact on the environment, should strive to preserve it.

Collaboration with stakeholders on the path to preserving biodiversity and respecting natural resources will help to effectively develop and implement measures to improve the environment.

In conclusion, I would like to note that the results of this study are an important step towards sustainable development and conservation of biodiversity in Kazakhstan. It confirms JSC Kazakhtelecom’s responsible approach to environmental issues and its desire to continuously improve its environmental performance.

10. RECOMMENDED ACTIVITIES FOR MANAGEMENT OF BIODIVERSITY, LAND, WATER RESOURCES

Recommendations for improving the environment in the area where kazakhtelecom jsc operates and preserving biodiversity, land, and water resources:

1. design: potential environmental impacts should be taken into account when designing and constructing new cable routes. this may include choosing routes that minimize impacts on sensitive ecosystems: water bodies, surface soil layers; use of modern technologies that reduce the impact on soil and water resources; selecting materials that minimize your environmental footprint.

2. waste management: it is important to ensure proper management of waste associated with telecommunication equipment. this may include recycling and reuse of materials, as well as safe disposal of waste.

3. training and awareness: it is important to ensure that all employees and contractors are aware of the importance of protecting the environment and are aware of the measures taken to improve it. this may include providing regular training to employees and setting out clauses in the contractual obligations of contractors.

4. monitoring and assessment of environmental status: regular monitoring and assessment of the environmental impact of activities is a key factor to ensure continuous improvement of environmental status. this may include conducting regular environmental audits and using bioindicators to track progress.

5. collaboration with stakeholders: it is important to work with stakeholders such as local communities, non-governmental organizations and regulators to jointly develop and implement measures to improve the environment.

6. transparency and reporting: the company should be transparent in its actions to improve the environment and regularly provide reports on its achievements.

7. use of alternative cable installation methods: consider using alternative cable installation methods, such as aerial suspension of special optical cables on railways or power line towers, to minimize environmental impact.

8. sustainable procurement practices: when purchasing equipment and materials, preference should be given to suppliers who follow the principles of sustainable development and have a positive environmental footprint.

These recommendations represent a comprehensive approach to improving the environment where telecommunications equipment passes. they require the active participation of all stakeholders and a constant commitment to improving the ecological state of the environment and preserving the rich biodiversity of nature.

Appendix A.

Table H.1 – Taxonomic composition of plant diversity

Latin (scientific name)	Name in state language	Title in Russian	Known for a given territory (indicating source of information)	Discovered (indicating the timing of the research)	Quantity	Photo
1	2	3	4	5	6	7
Aktobe region						
Medicago sativa	Aksary zhonyshka	Alfalfa	The stems are tetrahedral, glabrous or pubescent, strongly branched in the upper part, up to 80 cm tall, can be straight, widely bushy or recumbent. The rhizome is powerful, thick, deep-lying. Leaves on petioles. Leaflets are 1-2 cm long and 0.3-1 cm wide, oblong-obovate, entire. Peduncles are axillary, longer than the leaves. The raceme is capitate, dense, multi-flowered, 2-3 cm long. The flowers are blue-violet. The calyx is 0.5-0.6 cm long, tubular-funnel-shaped, hairy. The fruit is a bean, about 0.6 cm in diameter. *Grossheim A. A. Genus 790. Alfalfa—Medicago // Flora of the USSR = Flora* URSS *:* in 30 volumes */ ch. ed. V. L. Komarov . - M .; L.*	08.08.2023 Discovered	More than 50	

Taraxacum officinale	Bakbak	Dandelion officinalis	Dandelion officinalis - perennial a herbaceous plant up to 30 cm high, with a slightly branched tap root about 2 cm thick and about 60 cm long, in the upper part turning into a short multi-headed rhizome . leaves are bare, pinnately incised or entire, lanceolate or oblong-lanceolate, toothed, 10-25 cm long, 1.5-5 cm wide, collected in a basal rosette . *Barabanov E.I. Botany: textbook for students. higher textbook establishments. - M.: Publishing Center "Academy", 2006. - P. 348. - 448 p. — ISBN 5-7695-2656-4*	08.08.2023 Discovered	More than 50	
Trifolium repens	Ormelegish trouble	Creeping clover	Creeping clover - perennial herbaceous plant. The root is taprooted, shallow-rooted, highly branched, additional roots are formed at the nodes of the underlying stem. As they develop, additional roots create an independent root system that ensures the existence of the plant even after the death of the main root [. The stem is creeping, creeping, branched, bare, often hollow. *White clover // Encyclopedic Dictionary of Brockhaus and Efron : in 86 volumes (82 volumes and 4 additional). - St. Petersburg, 1890-1907*	Not detected		

Achillea millefolium	Kadimgi mynzhapyrak	.	The rhizome is thick, creeping, branched, with numerous thin, fibrous roots and underground shoots . Stems are few or solitary, erect or ascending, straight, less often sinuous, round, 20–80 (up to 120) cm high, angular-furrowed, glabrous or slightly pubescent, branching only in the upper part. The fruit is a flat, oblong silver-gray achene without wings, 1.5-2 mm long. *It blooms from June to late summer, the seeds ripen in July - September.* *Aden N. N., Terentyeva N. N. Etymological dictionary of scientific names of vascular plants growing wild and bred in the USSR. Vol. 1, A. - M.: Moscow State University Publishing House, 1979.*	08.08.2023 Discovered	Over 30	
Medicago lupulina	Kulmak Zhonyshka	Alfalfa hop-like	Leaves are on short petioles , with three broadly obovate or broadly rhombic leaflets, each of which is 7-15x3-10 mm with a wedge-shaped base, with a notch at the apex, the middle one on a longer petiole than the lateral ones. The lower surface of the leaflets has simple and glandular pubescence, the upper surface is bare or with sparse simple hairs. The flowers are no more than 2 mm long, yellow in color, in dense oblong-ovate racemes up to 1.5 cm long. The calyx is covered with simple hairs, with subulate-shaped teeth, 1-1.5 mm long. The fruits are nuts , which are reduced single-seeded beans about 2 mm long, kidney-shaped, covered with glandular pubescence, almost naked at maturity. Number of chromosomes 2n = 16. *Kultiasov, I.M., Grigorieva, N.M.* Hoppy alfalfa // Biological flora of the Moscow region. - M.: Moscow State University Publishing House, 1978	Not detected		

Trifolium pratense	Shalgyndy trouble	Clover	The leaves are trifoliate, with broadly ovate, finely toothed lobes, the leaflets are entire at the edges, with delicate cilia along the edges. The inflorescence heads are loose, spherical, often arranged in pairs and often covered with two upper leaves. The corolla is red, occasionally white or multi-colored; calyx with ten veins. The fruit is an ovoid, single-seeded bean; the seeds are sometimes round, sometimes angular, sometimes yellowish-red, sometimes purple. Weight of 1000 seeds is 1.5-2 grams.. *Beketov A. N., . Clover, plants from the legume family // Encyclopedic Dictionary*	Not detected		
Agropyron desertorum	Sholdi bidai shopteri	Desert wheatgrass	The rhizome is horizontal, cord-shaped. The stem is erect, hollow inside, leafy, glabrous. Leaves are alternate, flat, linear, glabrous, vaginal. The spikelets are turned flat towards the stem. The spikelets are sessile; at the base of the spikelet scales there are dents along which these scales break off during fruiting. Each spikelet is turned to the axis of the inflorescence with its long side, and not with a short edge, like a chaff *Martynenko V. A., Gruzdev B. I. Key to vascular plants in the vicinity of Syktyvkar. - Ekaterinburg: Ural Branch of the Russian Academy of Sciences, 2005.*	08.08.2023 Discovered	More than 100	

Gypsophila paniculata	Ak kanbak	Let's rock the paniculata	Kachim paniculata is a perennial herbaceous plant with a height of 60 to 100 cm with a powerful root system. The taproot is thick. The stems are strongly branched from the base, bare or covered below with short glandular hairs; form spherical bushes. The leaves are whitish, lanceolate or linear-lanceolate, 2-7 cm long and 3-10 mm wide, long-pointed, with three to five arcuate veins; the lower leaves wilt early. *Agababyan Sh. M. Forage plants of hayfields and pastures of the USSR*	08.08.2023 Discovered	Over 30	
Kyzylorda Region						
Cousinia pseudoaffinis Kult.	Kobenkuyryk	Cousinia false-related	Biennial, often perennial herbs or subshrubs with entire, pinnately dissected or lyre-shaped leaves, basal leaves usually different from the stem ones, often in a rosette; stems simple or branched. *About ң tү stik Kazakhstan obaldyny ң encyclopedias, 4th volume*	08.08.23 Discovered	More than 50	

Aeluropus intermedius Regel (family Poaceae)	Azhyryk	Pribrezhnitsa Intermediate	The rhizome is creeping with stems rising vertically . Flowers form one-sided spike-shaped panicles _ A perennial gray-green plant with long shoots branching at the base and rooting at the nodes. The root system is powerful and consists of adventitious roots that arise at the nodes of the shoots. *[[Kazakh Encyclopedias| "Kazakh Encyclopedias"]]*	08.08.23 Discovered	More than 50	
Nepeta saturejoides Boiss. (family Lamiaceae)	Kokzhalbyz	Catnip savory	Most species are herbaceous perennials , some are annuals . Stems are erect. Leaves are green to grayish-green. Flowers in whorled inflorescences ; corollas are usually no more than 10 mm in length, white or blue [2], less often pink or lilac. *Catnip, catnip // Basket - Kukunor. - M.: Soviet Encyclopedia, 1953. - P. 158. - (Great Soviet Encyclopedia : [in 51 volumes] / chief editor B. A. Vvedensky ; 1949-1958*	Not detected		
Haloxylon aphyllum (Minkw.) Iljin (family Chenopodiaceae)	Zhapyraksyz sexeul	Leafless saxaul	Shrubs or small trees (1.5-12 m high) with forked branching and brittle young shoots. Leaves are in the form of opposite small colorless scales or tubercles (photosynthesis is carried out by green branches). The flowers are bisexual, borne in groups of 4 in the axils of scaly bracts. Perianth of 5 filmy leaflets that form wings on the fruit (nut). The root system is powerful, extending 10-11 m. The trunk is uneven, strong, but sometimes fragile. The color of the bark is white, black, or brown. *Proskuryakova G. Saksaul // Science and life: magazine. — 1987.*	08.08.2023 Discovered	Less than 5	

Turkestan region						
Stipa	Kumdy kauyrsyndy shop	Sandy feather grass	Dense turf grass up to 1.1 m tall. Stems are bare or slightly rough under the nodes. Stem leaves are 4-16 cm long and up to 1.2-3 mm wide, the outside is sharply woolly with bent bristles. Barren ears are bluish-green, 10-15 cm long, shorter than the stem; leaves are bare and smooth below, bare or slightly rough on top; the tongues are ovate-oblong, with an extended triangular apex. Broom with 8-17 ears; its axis is 11-18 cm long, glabrous, with a tassel of hairs at the lower node; glumes 5-7.5 cm long; lower floral scale 17-21 mm long, two marginal stripes of hairs do not reach the base of the awn, the middle one is much longer than the lateral ones; the awn in the lower part is twisted and partially rough, in the upper part it is pinnate; the bare part of the awn is yellowish, later brown. Blooms in May-June. *Tsvelev N. N. Stipa pennata subsp. sabulosa – Sandy feather grass // Cereals of the USSR*	Not discovered		
Festúca valesiaca	Betege	Vallis fescue, or fescue	A perennial, waxy -blue, densely turfy grass 10–50 cm high with a large number of shortened vegetative shoots. The stems are thin, erect, smooth or slightly rough at the top. The vaginas are short, gray, narrow and smooth. The leaves are sinuous, thread-like, 0.3-0.6(0.8) mm in diameter, noticeably shorter than the stem, bristly, bis-cuit-shaped in cross-section (with two more or less deep grooves on the sides of the folded leaf), very rough [1]; the tongue is very short. *Tsvelev N.N. Cereals of the USSR / Responsible. ed. Fedorov A. A.. - L.: Nauka, 1976.*	Not discovered		

Anabasis salsa	Sortandy buyyrgyn, nemese biyurgun	Salt marsh barnacle, or Biyurgun	Subshrub 5-25 cm high, with woody, highly branched branches at the bottom, producing numerous, light or bluish-green or sharply bluish-green, cylindrical, 1-2 mm in diameter at the base, bare, annual shoots, consisting mostly of 5 -12 sometimes elongated (up to 40 mm), sometimes very shortened (up to 2-3 mm) internodes. *Pavlov N.V. Plant raw materials of Kazakhstan*	Not discovered		
Jambyl Region						
Adōnis vernalis	Koktemdik zhanargul	Adonis spring, or Goritsvet	Perennial herbaceous plant. The rhizome is vertical, short, with cord-like brownish-black roots. The stems are round, smooth, almost bare, erect or deflected, simple or weakly branched, densely leafy with appressed branches, at the beginning of flowering 5-20 cm in height, lengthening to 30-40 cm after flowering. *Gammerman A.F., Grom I.I. Wild medicinal plants of the USSR.*	07/31/23 Discovered	More than 10	

Astragálus glycyphýllos	Mia astragalus	Astragalus licorice	A perennial herbaceous plant 45–90 cm high. The stem is erect or prostrate, 50–100 (up to 150) cm long, thick, recumbent, simple, branched in the lower part, granite-furrowed, scantily and finely white-fluffy. Stipules are free, yellow-green or green, pointed, transparent, 10-20 mm long, sparsely white-ciliated, lower ovate, upper lanceolate. Leaves are (8) 10–20 (23) cm long, without a distinct petiole, imparipinnate; leaflets (4) 5-6 (7)-paired, elliptic, rarely oblong-ovate, 18-40 (60) mm long, glabrous above, scatteredly appressed below and short white-hairy, rounded-obtuse at the apex. ***Universal encyclopedia of medicinal plants / comp. I. N. Putyrsky, V. N. Prokhorov. - M.: Makhaon, 2000***	Not detected		
Nymphaea candida	Su lalaguli karly ak	Water lily snow-white, or pure white	Snowy water lily is a perennial aquatic plant. It differs from the white water lily in lighter flowers, a strongly depressed bright orange stigma and an almost quadrangular base of the calyx. The rhizome is long, horizontal. The leaves are floating, round, up to 20-30 cm in diameter. The flowers are white, up to 15 cm in diameter, slightly fragrant. The gynoecium is syncarpous, with a semi-inferior ovary. *Komarov V. L. Genus 504. Water lily - Nymphaea*	07/31/23 Discovered	More than 10	

Almaty Region						
Crataegus Tourn. ex L	Dolan	Hawthorn	During germination, the cotyledons are carried above the ground; they are ovoid or elliptical, somewhat fleshy, glabrous, short-petiolate, 4-13 mm long. The subcotyledonous part of the seedling is 1-6 cm long, glabrous, usually reddish. The first leaves are alternate, close together, much smaller than normal and with a less deeply and intensively cut blade. During the first year or two years, seedlings grow slowly; annual growth does not exceed 7-20 cm, then growth increases and reaches 30-40 (up to 60) cm per year, which continues until 6-8 years of age; after this, growth slows down again. Flowering and fruiting occurs at the age of 10-15 years. Life expectancy is 200-300 (up to 400) years. *M. A. Nosal, I. M. Nosal. Medicinal plants and methods of their use among the people / Ed. acad. Academy of Sciences of the Ukrainian SSR V. G. Drobotko . - Kyiv: State Medical Publishing House of the Ukrainian SSR, 1959.*	Not detected		

Populus tremula	Kokterek	Aspen	Aspen stands out with a columnar trunk reaching 35 m in height and 1 m in diameter . The root system is located deep underground. Produces root shoots abundantly . The bark of young trees is smooth, light green or greenish-gray; closer to the butt , it cracks and darkens with age. The wood is white with a greenish tint. *Aspen, in forestry // Encyclopedic Dictionary of Brockhaus and Efron : in 86 volumes (82 volumes and 4 additional). - St. Petersburg, 1890-1907*	Not detected		
Salix	Tal	Willow	The foliage of some species of willows is dense, curly, green, while others have sparse, see-through, gray-green or gray-white foliage. Leaves are alternate, petiolate; The leaf blade in some species is wide and elliptical, in others it is quite narrow and long; The edge of the plate is entire in only a few species, while in the majority it is finely or coarsely serrated. The plate is either shiny, bright green on both surfaces, or only on the top; The lower surface of such willows is gray or bluish due to hairs and a bluish coating. *Willow // Willow - Italics. - M.: Soviet Encyclopedia, 1972*	Not detected		

Populus alba	Ak terek	White poplar	The tree, under favorable conditions, reaches a height of up to 30–40 m and a trunk diameter of up to 2 m [3]. The crown is wide, tent-shaped, starts low from the ground, with a single development. The powerful root system extends beyond the projection of the crown and consists of both deep-lying and superficial roots, which produce abundant root shoots, often at a considerable distance from the mother tree. The bark of the trunk and large branches is gray-green, smooth; young shoots are white-tomentose; in old age, the bark is dark gray or black, with deep cracks. *Sokolov S. Ya., Shipchinsky N. V., Yarmolenko A. V. Rod 3. Populus L. - Poplar*	Not detected		
Malus sieversii	Sievers Almasy	Sievers apple tree	The Sievers apple tree is a deciduous tree , in favorable conditions reaching a height of 5 to 12 meters, externally very similar to many varieties of cultivated apple trees. The pollen is heterogeneous in size, oval in shape when dry, spherical when wet [. The fruits have the maximum size among all types of wild apple trees and reach 7 cm in diameter, which is close to the size of the fruits of many varieties of domestic apple trees . Unlike cultivated apple trees, the leaves of most Sievers apple trees turn red in the fall *Aghababyan Sh. M.* Forage plants of hayfields and pastures of the USSR	Not detected		

Zhetysu region						
Ferula	Sasyr	Ferula	These are perennial herbaceous plants, often with a thick and tall, sometimes gigantic stem, 1-4 meters high. The leaves are predominantly basal, collected in a rosette, with a triple-dissected plate. The umbrellas are large, without wrapper, collected in a panicle. There are two types of umbrella arrangement: *Korovin E. P. Genus 1052. Ferula - Ferula // Flora of the USSR*	Not detected		
Artemisia	Zhusan	Sagebrush	Wormwoods are bi- and perennial (less often annual) herbs and subshrubs 3-150 cm high, with thick woody roots. Stems are usually straight. The entire plant has more or less dense whitish or grayish pubescence, often silvery or tomentose. The leaves are most often palmate or pinnately divided, alternate, dissected, less often entire and entire, the lobes are small and thin. The lower leaves are larger, often on long petioles, the middle and upper leaves are smaller, less dissected, usually sessile. The flowers are extremely small, often yellow, sometimes reddish, collected in small *Genus 1550. Wormwood - Artemisia L. // Flora of the USSR*	Not detected		

Rúmex crispus	Buyra kymyzdyk	Curly sorrel	Perennial herbaceous plant. root , long; brown, yellow at the break. On well-drained soils, roots penetrate to a depth of 1 meter [1]. The stem is erect, 50-120 cm high, grooved, glabrous, reddish in color. *Stankov S.S. Wild useful plants of the USSR. - UCHPEDGIZ, 1946.*	Not detected		
East Kazakhstan region						
Hedysarum (family Fabaceae)	Tiyntak	Penny	A perennial herbaceous plant with a stem height of 30 to 150 cm. It forms a tap root and is drought-resistant. Leaves up to 15 cm long are imparipinnate with 5-11 leaf fragments that are elliptical, oval or obovate and 1.5-4 cm long. The inflorescences are 5-15 cm long and consist of up to 40 flowers from wine red to purple. An albino form with white petals is rare. *Encyclopedic Dictionary of Brockhaus and Efron : in 86 volumes (82 volumes and 4 additional). - St. Petersburg, 1890-1907 .*	02.08.23 Discovered	Less than 10	

Pedicularis venusta Schangin ex Bunge (family Scrophulari-aceae)	Kandygul	Mytnik cute	Mostly perennial , less often annual , sometimes biennial herbaceous plants - semi-parasites. Strict host specificity is not observed among representatives of the genus. The roots are often woody, the lateral roots are sometimes tuberously thickened. Haustoria are formed on the lateral roots and attach to the roots of surround-ing plants. The size of the haustoria varies depending on the species. In the king's scepter myrtle (*Pedicularis sceptrum-carolinum* L.), the haustoria reach 3 mm in di-ameter - perhaps the largest haustoria among European hemiparasites. The leaves are usually dissected to one degree or another, in most species they are alternate, less often opposite or in whorls. *Kosachev , P. _ A . Mytniki (Pedicularis L.) of the Altai mountainous country. - Barnaul: Alt Publishing House. Univ., 2013 .*	02.08.23 Discovered	Less than 10	
Geranium laetum Ledeb. (family Gera-niaceae)	Shalgyndyk kaztamak	*Geranium lush*	*In favorable conditions it forms a fast-growing bush up to 50 cm tall.* *The leaves are pubescent, five-parted, serrated along the edges.* *The flowers are light purple.* *Flowering begins in July* *Karpisonova R. A. Geraniums in the garden. - M.: Kladez-Books, 2006. - P. 15*	Not discovered		

Callianthemum sajanense (Regel) Witasek (family Ranunculaceae)	Irekgul	Callianthemum Sayan	The flowers are solitary at the top of the stem or on branches, regular. Tepals number from 5 to 16, linear or broadly ovate in shape, white, with a yellow spot at the base. Stamens and pistils are numerous. The fruit is a multi-nut; Nuts with a short nose, naked. *Shipchinsky N.V. Flora of the USSR = Flora URSS: in 30 volumes / chapter. ed. V. L. Komarov . - M.; L.: Publishing House of the USSR Academy of Sciences , 1937. - T. 7*	Not discovered		
Lathyrus humilis (Ser.) Spreng. (family Fabaceae)	Zhatagana rank	China is squat	The leaf axis ends with a branched, sometimes simple tendril. Leaflets number (2) 3–5 pairs, 1.5–4 cm long, 0.7–2 cm wide, elliptical or ovate, glabrous on both sides. Stipules are semi-arrow-shaped, ovate or lanceolate, 6–13(18) mm long. Flowers are reddish-violet, turning blue when dried, (1) 2–4 in loose racemes. The calyx is 7–9 mm long, with lanceolate-subulate teeth, of which the upper two are no longer than half the tube, the lowest one is almost equal to it. Corollas (16) 17–19 mm long. The ovary, mainly in the lower part, is densely short-haired. The pods are oblong-linear, 3–4.5 cm long, pubescent with short curly hairs or glabrous. *Agababyan Sh. M. Forage plants of hayfields and pastures of the USSR*	02.08.23 Discovered	Over 30	

Abay region						
Goniolimon callicomum (CA Mey.) Boiss. (family Plumbaginaceae)	Ademi shoqtygy bar Goniolimon	Cornstem beautifully bunched Goniolimon beautifully bunched	A perennial tap-root herbaceous plant with an erect stem 15 to 40 cm high. The stem in the upper part is corymbose-branched, with bluntly triangular, narrow-winged branches. The stem leaves are scale-like, basal, up to 15 cm long, obovate-lanceolate, narrowed into a petiole, wavy along the edge, with a pointed end. The flowers are relatively small, bisexual, five-membered, arranged singly or in twos. The corolla is white, with five oblong petals fused at the base. The calyx is tubular, fused-petalled, five-toothed at the apex. *Red Data Book of the Volgograd Region*			
Goniolimon eximium (Schrenk) Boiss. (family Plumbaginaceae)	Keremet Buryshtysabak	Superb blackstem	The shrubs are usually thorny, branched, up to 50 cm high. The stem is often erect, branched, with creeping shoots and narrow-leaved branches The inflorescence is a spike, in the form of a corymbose panicle. Petals are pinkish-violet. The corolla is mostly white, with petals fused at the base. Flowering period is mid-summer. *Shipchinsky N.V. Flora of the USSR = Flora URSS: in 30 volumes / chapter. ed. V. L. Komarov . - M.; L.: Publishing House of the USSR Academy of Sciences , 1937. - T. 7*	Not detected		

Eryngium macrocalyx Schrenk (family Apiaceae)	Kokbas	Large-cupped eryngium	As a rule, umbellifers are perennial (but often monocarpic) herbs, sometimes biennial or annual, and some are shrubs or small trees. Representatives of the family are easily recognized by their characteristic inflorescences - complex umbrellas, or, less commonly, inflorescences - simple umbrellas or heads. The flowers are small, mostly white, less often yellow or blue, usually regular, bisexual, the calyx is barely noticeable, the corolla has five petals, one pistil, the ovary is semi-inferior, bilocular. *Grudzinskaya L.M., Gemedzhieva N.G., Nelina N.V., Karzhaubekova Zh.Zh. Annotated list of medicinal plants of Kazakhstan. Reference publication. – Almaty: 2014. – 200 p.*	Not detected		
Astragalus pallasii Biehler (Family Fabaceae)	Pallas Astragalus	Astragalus of Pallas	A perennial herbaceous plant 10–20 cm high with a taproot system and numerous rosette shoots. The internodes of the stem are greatly shortened. The leaves are imparipinnate, up to 15 cm long with 8-12 pairs of leaflets. Leaves are 6-12 mm long, elliptical, glabrous above, pubescent below. Peduncles are slightly shorter than the leaves. Flowers in dense multi-flowered racemes. Corolla purple. Flowering in May. The fruit is a spherical swollen naked bean. Reproduction is exclusively by seed. *Korovin E. P. Genus 1052. Ferula - Ferula // Flora of the USSR*	Not detected		

Pavlodar Region						
Filipendula ulmaria	Shegirshin zhapyrakty tobylgy	Meadowsweet	A perennial herbaceous plant up to 1.5–2 m high with an erect, smooth, ribbed, densely leafy, simple or branched stem and a fibrous root system. The rhizome is creeping. The roots are without tuberous thickenings. The leaves are intermittently pinnately divided with two to three pairs of lateral pointed serrates and one larger terminal leaflet, divided into 3-5 lobes. They are bare dark green above, white felt below. Between the large leaves there are intermediate small, sharply toothed leaves. When rubbed, the leaves emit a pungent odor. The lateral leaflets of the basal leaves are four to ten pairs, from broadly ovate to ovate-lanceolate, entire or slightly lobed, incised serrate. The flowers are numerous small yellow-white cream fragrant, collected in dense loose panicles up to 20 cm long. Petals and calyx lobes five (rarely six petals. Petals with a long nail; hypanthium is flat; stamens are 1.5-2 times longer than the petals. Blooms in June-July. *Universal encyclopedia of medicinal plants / comp. I. N. Putyrsky, V. N. Prokhorov. - M.: Makhaon, 2000*	Not detected		

Sanguisorba officinalis	Darilik kandyshop	Burnet	The rhizome is thick, horizontal, up to 12 cm long, woody, with numerous long and thin fibrous roots . The roots penetrate to a depth of 1 m [8]. The stem is mostly single, branched in the upper part, ribbed, hollow inside, glabrous, erect, 30-90 cm high. The basal leaves are long-petiolate, large, odd-pinnate with seven to twenty-five leaflets, shiny dark green above, dull bluish-green below; stem sessile, imparipinnate. The leaves are oblong-ovate, crenate or sharply serrate along the edge. *Agababyan Sh. M. Forage plants of hayfields and pastures of the USSR*	Not detected		
Hordeum jubatum	Zhaldy arpa	Maned barley	A dense turf perennial with a short rhizome and thin smooth stems 15–50 cm high. Leaf blades are up to 3-8 cm long (not counting the length of the awns), dense, expanding upward, with a brittle axis. Spikelets are single-flowered, collected in groups of three; the middle one is sessile, with a remnant of an underdeveloped second flower, the lateral ones are stalked, underdeveloped. The glumes are hair-like, protruding, 3-6(7.5) cm long. The lower lemma of the average spikelet is 4-5 mm long, with a hair-like, usually purple awn 2-9 cm long. Anthers 1.2–1.6 mm long *Poletiko O. M., Mishenkova A. P. Ornamental herbaceous plants of open ground. Handbook of Nomenclature of Genera and Species . - L.: Nauka , 1967. - 208 p. — P. 94.*	Not detected		

Cosmos bipinnatus	Cosmea ekikanatta	Cosmea bipinnate	The plant reaches a height of up to 150 cm. The stem is straight, densely branched , the leaves are openwork, twice pinnately dissected into thread-like lobes. Inflorescences are multi-flowered baskets on long bare peduncles, solitary or collected in loose, corymbose panicles. Cosmos inflorescences are large, up to 7-10 cm in diameter, with sterile ligulate and bisexual tubular flowers. The main colors of the reed flowers are white, pink and red. *M. A. Nosal, I. M. Nosal. Medicinal plants and methods of their use among the people / Ed. acad. Academy of Sciences of the Ukrainian SSR V. G. Drobotko . - Kyiv: State Medical Publishing House of the Ukrainian SSR, 1959*	Not detected		
North-Kazakhstan region						
Chelidonium	Suyelshop	Celandine	Erect perennial herbaceous plants with a rounded stem, exuding milky juice when cut. The rhizome is brown. The leaves are pointed, ovate, and can be stem or basal. The basal leaves are obovate-oblong to lanceolate in shape, collected in a rosette; stem leaves are arranged alternately. The flowers are numerous, four-petaled, yellow, collected in an umbrella-shaped inflorescence. The fruit is a bare, narrow-cylindrical capsule, bearing numerous small shiny seeds. *Grudzinskaya L.M., Gemedzhieva N.G., Nelina N.V., Karzhaubekova Zh.Zh. Annotated list of medicinal plants of Kazakhstan. Reference publication. – Almaty: 2014. – 200 p.*	Not detected		

Onula helenium	Biik andyz	Elecampane tall	The rhizome is thick, short, fleshy, with a few thick roots extending from it. The rhizomes and roots are brown on the outside, yellowish on the inside. The stem is erect, grooved, pubescent with short dense white hairs, 100-175 cm high. The leaves are alternate, large, unequally toothed, velvety-gray felt underneath; basal leaves are petiolate, elliptical or elongated-ovate. *Agababyan Sh. M. Forage plants of hayfields and pastures of the USSR*	Not detected		
Tussilágo	Ogeishop	Coltsfoot	In early spring, erect, low flowering shoots begin to develop, covered with ovate- lanceolate , often brownish, scale-like leaves . On each of the shoots a single, drooping basket develops before and after flowering , consisting of a cylindrical single-row involucre , a bare flat receptacle and bright yellow flowers of two types. Numerous outer (marginal) flowers are female, ligulate (the clearly expressed ligule of the marginal flowers is a diagnostic feature by which the coltsfoot differs from plants of the genus Butterbur, in which this ligule is not clearly expressed, the corollas are almost thread-like, and the number of marginal flowers is relatively small), fertile. The flowers that are in the middle of the inflorescence are bisexual, tubular, sterile. *Barkalov V. Yu.* Genus Coltsfoot - *Tussilago* L. // Vascular plants of the Soviet Far East	Not detected		

Hypericum	Shaikurai	St. John's wort	Representatives of the genus are perennial, very rarely annual herbaceous plants, subshrubs, shrubs or trees. The stems are mostly tetrahedral. The leaves of some species are opposite, rarely whorled, mostly entire, sessile or with short petioles, on the surface and at the edges or only at the edges, often with translucent, sometimes with black dotted oily glands. *Kazakh Encyclopedias , volume 9*	Not detected		
Kostanay region						
Sedum	Bozkilem	sedum	Perennial, less often biennial herbaceous plants, less often subshrubs or shrubs. The leaves are fleshy, entire, usually alternate and sessile. The flowers are star-shaped, actinomorphic, bisexual, collected in umbellate, corymbose or racemose dense inflorescences. Flowering - in summer or autumn. When cultivated, plants are propagated by rooting shoots, dividing bushes and seeds *V. V. Byalt // Great Russian Encyclopedia: [in 35 volumes]*	08/07/23 Discovered	More than 10	

Saponaria officinalis,	Darilik sabyn	Soapwort officinalis	Perennial 30-100 cm high, with a highly branched reddish-brown horizontal rhizome. Stems are numerous, erect, knotty, glabrous or rough with short hairs. Leaves are opposite, oblong or oval, pointed, 5-12 cm long and 1-4 cm wide, with three longitudinal veins, glabrous, upper - sessile, lower - with short petioles. Flowers up to 5 cm in diameter, fragrant, collected in multi-flowered corymbose-paniculate inflorescence. Pedicels are shortened, bracts are linear-lanceolate. The calyx is tubular-cylindrical, five-toothed, 15-18 mm long and 4-5 mm wide. The corolla is separate-petaled, consisting of five petals, one and a half times longer than the calyx. The petals are white, less often white-pink, the limb of the petals is oblong-obovate with long nails, often notched at the top. At the base the petals have two small appendages. There are ten stamens, a pistil with two filiform styles and an upper ovary. Blooms from June to September. *Agababyan Sh. M. Forage plants of hayfields and pastures of the USSR*	08/07/23 Discovered	Over 30	
Lythrum salicaria	Talzhapyrak tergul	Loosestrife	The stem is straight, tetrahedral, 80-140 cm high (up to 2 m), usually branched in the upper part. The root is thick and woody. The lower leaves are usually opposite, less often whorled; the upper ones are alternate, oblong, up to 10 cm long. The flowers are numerous, star-shaped, small, up to 1 cm in diameter, collected in dense spike-shaped inflorescences located in the axils of the bracts. The corolla is purple, petals are up to 14 mm long. The fruit is an oblong-oval capsule 3-4 mm long, the seeds are small. It blooms in July-August, bears fruit in August. Propagated by division and seeds. *Progunkov V.V. Resources of honey plants in the south of the Far East.*	08/07/23 Discovered	More than 20	

Akmola region						
Centaurea	Gulkekire	Cornflower	Cornflower, or blue cornflower (Centaurea cyanus), with cobwebby-woolly linear-lanceolate leaves and blue flowers, as a weed plant, is found mainly in winter crops, especially on sandy and loamy soils, and, as an annual plant, is propagated by seeds, often sown together with cereals, if the latter are poorly cleaned, as well as those found with the inflorescences of this plant in straw, taken to the field along with manure. Measures to exterminate it consist of liming the soil. *Great Soviet Encyclopedia : [in 30 volumes] / ch. ed. A. M. Prokhorov .*	08/05/23 Discovered	More than 20	
Carduus	Tuyetiken	Thistle	Most of the representatives of the genus are thorny herbaceous plants. In many ways it is similar to thistle (Cirsium), differing mainly in the tuft, consisting only of capillaries, and not at all in feathery bristles; stem usually with thorns; achenes quadrangular or somewhat flattened, with 5–10 or more nerves or without nerves. *Encyclopedic Dictionary of Brockhaus and Efron : in 86 volumes.*	08/05/23 Discovered	More than 20	

Cichorium	Shashyratky	Chicory	It has a long, strong taproot that penetrates deeply into the soil. In the first year, a rosette of bright oblong leaves with a clearly defined main vein appears. Leaves may be rounded at the end or tapered. A rigid, vertical, recessed stem appears in the second summer. The flowers are ligulate, large, bisexual, often blue, less often pinkish or white, located on a short individual stalk extending from the top of the leaf. The flowers are in baskets with a double involucre, the outer leaves of the involucre are short, bent, the inner ones are erect. The flowers open successively upward, although they are often closed in cloudy weather. *Encyclopedic Dictionary of Brockhaus and Efron : in 86 volumes*	08/05/23 Discovered	More than 10	
Karaganda region						
Trifolium campestre	Dalalyk trouble	Field clover	Field clover is an annual herbaceous plant that reaches a height of 5-18 cm. The stem is straight, usually branched. Leaves are obovate, wedge-shaped, up to 11 mm long. Inflorescences have round or oval heads. The flowers are yellow, light brown at the end of flowering, 4-6 mm. The fruit is a single-seeded bean. *Lyubskaya A.F.* Forage plants of hayfields and pastures of the USSR	Not detected		

Thýmus,	Zhebir	Thyme	Low-growing shrubs or subshrubs up to 35 cm tall with woody recumbent or ascending stems (stems), erect or ascending herbaceous flowering branches and often with recumbent sterile shoots. The root is taproot, woody. The stems are woody at the base, spread over the soil, branched, covered with downward or erect hairs. The leaves are varied in size, veining and shape (from round or ovate to linear-oblong), hard, almost leathery, short-petiolate, less often sessile, entire or sometimes serrated (a constant feature in some Far Eastern species). Flowering in June - August. The fruits ripen in August - September. *Gogina E. E. Variability and morphogenesis in the genus Thyme.*	Not detected		
Spiraea	**Tobylgy**	Spirea	Plants are from 15 cm to 2.5 m high. The root system is fibrous and shallow. The branches are erect, spreading, recumbent, ascending or creeping, from light to dark brown, with longitudinally exfoliating bark. Young shoots are light green, yellowish, reddish or brown, glabrous or pubescent. The buds are small, in some species up to 0.5-1 cm long, single or two, round, ovoid to pointed, glabrous or pubescent, with 2-8 scales. Leaves are alternate, petiolate, without stipules, narrowly lanceolate-linear to round, 3-5-lobed, simply or doubly serrate-toothed. The inflorescences of species that bloom in spring are sessile or almost sessile umbels or corymbose racemes with a rosette of leaves at the base; in species that bloom in summer, simple or complex shields at the ends of short leafy branches or shoots of the current year; in late-flowering species there are narrow-cylindrical, broadly pyramidal or elliptical panicles at the ends of	Not detected		

			long, leafy shoots of the current year. *Dyakova I. N., Tolstikova T. N. Biological features of leaves of representatives of the genus Spiraea // Bulletin of the Adygea State University. Series 4: Natural, mathematical and technical sciences: magazine. — 2011.*			
Rōsa	Itmuryn	Rose hip	Rose hips are deciduous shrubs and shrubs, sometimes evergreen, with erect, climbing or creeping stems of varying heights or lengths, from 15-25 cm to 8-10 m. The height of the same species can sometimes vary depending on growing conditions.Usually rose hips are multi-stemmed shrubs up to 2-3 m tall and live up to 30-50 years. But some specimens of these species, reaching an age of several hundred years, grow into entire trees. The oldest rose [de] (dog rose) grows in Germany on the territory of Hildesheim Cathedral. Its age, according to various estimates, is from 400 to 1000 years. It reaches 13 m in height, and the girth of its trunk at the base reaches 50 cm. In the subtropics, evergreen liana roses are found almost everywhere. If they reach a tree-like form, their trunk shape is usually curved and twisted. *Mikhailova V.P., Lushpa O.U.* Qualitative studies of some Kazakh plants for the content of flavone substances // Medicinal plants of Kazakhstan. - Alma-Ata, 1966. - pp. 139-152.	Not detected		

Ulytau region						
Lobelia erinus L. (family Lobeliaceae)	Karakat Ispettegiya Lobelia	Lobelia urchin	Perennial a herbaceous plant with thin, highly branched, densely leafy shoots without a basal rosette . The bushes are spherical, compact or creeping, 10-40 cm tall; internodes close together. Flowering shoots of the first, second and third orders develop. The shoots contain milky juice. Stems adjacent to the ground are capable of rooting. The leaves are alternate with a spiral arrangement, oval-spatulate, entire, notched-toothed along the edge, pointed, small, 3-6 cm long and 1-1.5 cm wide, light or dark green, also found with a purple tint. *Golovkin B.N., Kitaeva L.A., Nemchenko E.P.* Ornamental plants of the USSR. - M.: “Mysl”, 1986. - P. 262-263.	Not detected		
Galitzkya spathulata (Steph. ex Willd.) VV Botschantz. (family Brassicaceae)	Kurektti Galiktiya	Galician spatula	Perennial herbaceous plant. The root is woody, multi-headed. The stem shoots are woody, producing bunches of numerous basal leaves and unbranched herbaceous shoots up to 15 cm tall, forming a small dense turf. The entire plant, except the fruits, is densely covered with white-grayish star-shaped hairs. The basal and lower stem leaves are rounded or transversely elliptical, rarely broadly ovate, about 1 cm wide. The remaining stem leaves are sessile, oblong, about 1.2 cm long and up to 0.3 cm wide. Brushes are short, 1.5 cm long, sparse, corymbose. The flowers are white. The pods are almost rounded or rounded-obovate, flattened, glabrous, about 0.9 cm long and up to 0.8 cm wide. *Red Book of Altai Territory*	Not detected		

Anabasis eriopoda (Schrenk) Benth. ex Volkens (family Chenopodiaceae)	Zhundi ayakty Anabasis	Anabasis woollyfoot	Subshrubs or perennial herbs with jointed stems and opposite short fleshy or small scale-like, sometimes completely undeveloped leaves. The flowers are bisexual, five-membered, solitary or 2-6 in the leaf axils. The perianth is simple, membranous, made of blunt leaflets, of which the posterior and two anterior ones are wider, the two middle ones are narrower, and the fruits mostly have wing-like appendages. There are five stamens, without appendages; their threads grow together into a subpistil disc and alternate with semicircular and oblong lobes (“staminodes”) of the subpistil disc. Ovary with two or three short and thick stigmas. The fruit is berry-shaped. The seed is vertical with a spiral embryo. Genus 433. Barnyard grass - Anabasis L. // Flora of the USSR = Flora URSS: in 30 volumes / chapter. ed. V. L. Komarov . - M.; L.: Publishing House of the USSR Academy of Sciences , 1936. - T. 6 / ed. volumes by B.K. Shishkin . — P. 281-302. - 956, XXXVI p. — 5200 copies.	Not detected		

Tamarix (family Tamaricaceae)	Zhyngyl	Comber	Evergreen or deciduous shrubs or trees, often growing in a bushy manner, 3-5 (up to 12) m high, with a trunk diameter of about 50 cm. The crown is formed by numerous thin and small branches and twigs or coarse and blunt branches. The leaf arrangement is regular. Leaves are 1-7 mm long, scale-like, sessile, semi-stem-encompassing or stem-encompassing, slightly different on shoots of the first and second year, without stipules, covered with depressions from salt-secreting glands. The flowers are bisexual, only in the dioecious Tamarix dioica they are dioecious, small, 1.5-3 (up to 5) mm long, collected on one-year-old branches, in simple or complex racemes or, on the rest, in panicles. Bracts are ovate, lanceolate, linear or subulate, obtuse, sharp or with a cartilaginous apex, often curved inward, straight, deflected or reflexed, shorter or longer than the pedicels or calyxes together with pedicels. The calyx is four-five-parted, sometimes seven-parted, leathery or fleshy; the lobes are ovoid, ovate-lanceolate, triangular-ovate or oval-rhombic, almost round, pointed or obtuse. Petals four or five, rarely up to seven; ovoid, obovate, oblong, oblong-oval or elliptical; pink or purple, less often scarlet or white; obtuse or slightly notched at the top; falling off or, less commonly, remaining with the fruit. *Popova T. N.* Tamarisk family (Tamaricaceae) // Plant life: in 6 t	Not detected		

Mangistau region						
Zinnia elegans	Symbatta Zinnia	Zinnia graceful	The seeds are large, 8-14 mm long and 2-6 mm wide, strongly flattened. Their shape is very diverse - from narrow wedge-shaped to broadly ovoid. The surface of the achene is rough, covered with tubercles, and has a keeled rib on its underside. Color: dark gray, brownish or brown. The number of chromosomes in somatic cells is 2n = 24 [*Annual flower plants / Comp. Vakulenko V.V., Aleynikova T.M. - M.: Ministry of Agriculture of the RSFSR, 1961. - P. 221-229*	The area has not been explored		
Metrosideros excelsa, syn. Metrosideros tomentosa	Metrosideros	Pohutukawa, or Metrosideros tomentosa	Pohutukawa are evergreen trees up to 15 m high, with a large rounded crown. When young they grow like shrubs with dense branches; a massive main trunk develops later. Free-standing trees often have aerial roots, which more firmly hold the huge crown. The plant can survive in the most windy areas. The leaves are dark green, matte above, gray and woolly below. At the end of December, around Christmas time, there is a massive flowering of pohutukawa. In this case, the entire crown is covered with bright red-burgundy velvety flowers (there are also varieties with yellow flowers). *Botany. Encyclopedia "All Plants of the World"*	The area has not been explored		

Symphoricarpos albus	Ak karzhemis	White snowberry, or white snowberry	Deciduous shrub up to 1.5 meters high with thin shoots. The leaves are opposite, ovate or oval, entire, up to 2-5 cm long. The upper side is green, glabrous, the lower side is glaucous and slightly pubescent. The flowers are small (0.6 cm in diameter), with a bell-shaped 4-5-lobed pink corolla, collected in dense racemose inflorescences in the leaf axils. Blooms from May to September. The fruits are spherical, up to 1 cm in diameter, white, with two seeds inside, inedible. They ripen in September and do not fall off for a long time. Propagated by seeds and root suckers *Kazakhstan tabigati: Encyclopedia / Bass ed. B.O.Zhakyp. - Almaty: "Kazakh encyclopedias" ZhS, 2011. T.Z. - 304 bet*	The area has not been explored		
Catharanthus roseus	Alkyzyl Cataranthus	Catharanthus pink	Branched evergreen subshrub 30–60 cm tall. The root system is taproot, the root is 25-35 cm long, with numerous lateral roots. Young roots without root hairs. The roots are light yellow in color and have a strong specific odor. The bark of pink-flowered plants is anthocyanin-colored, while that of white-flowered plants is green or light green. As the stem ages, it becomes woody and the internodes shorten. *Saakov S.G. Greenhouse and indoor plants and their care / Ed. ed. Kamelina R.V. - L.: Nauka, 1983. - P. 126-127. — 621 s*	The area has not been explored		

Atyrau region						
Anabasis cretacea Pall. (family Chenopodiaceae)	Borly Anabasis	Anabasis cretaceous	Subshrubs or perennial herbs with jointed stems and opposite short fleshy or small scale-like, sometimes completely undeveloped leaves. The flowers are bisexual, five-membered, solitary or 2-6 in the leaf axils. The perianth is simple, membranous, made of blunt leaflets, of which the posterior and two anterior ones are wider, the two middle ones are narrower, and the fruits mostly have wing-like appendages. There are five stamens, without appendages; their threads grow together into a subpistil disc and alternate with semicircular and oblong lobes (“staminodes”) of the subpistil disc. Ovary with two or three short and thick stigmas. The fruit is berry-shaped. The seed is vertical with a spiral embryo. *Encyclopedic Dictionary of Brockhaus and Efron : in 86 volumes (82 volumes and 4 additional).*	The area has not been explored		
(Czern. ex Turcz.) Cruchet Erucastrum armoracioides	Zhelkek bugy	Horseradish stag	The seeds are spherical, dark brown, brown or greenish-gray, 1-1.5 mm long, 0.75-1.25 mm wide and thick, cellular. Shoots with obverse kidney-shaped, fleshy cotyledons, on long petioles, 3-5 mm long, 5-7 mm wide. The first leaves are elliptical, pubescent. The leaves are alternate, oblong-elliptical, somewhat fleshy, pubescent, bluish-green. The lower leaves are oblong-obovate, notched-pinnately incised, with a wide midrib, on short petioles. Horseradish stag grows almost everywhere, but is most common in the chernozem zone of the steppe zone, to the north - as an alien plant. Drought-resistant plant. Prefers fertile soils with heavy mechanical composition.	The area has not been explored		

			Capable of withstanding compaction and trampling. *Bazdyrev G.I. Weeds and measures to combat them in modern agriculture: A textbook for universities. M.: Publishing house MCHA, 1993.- p. 242. ISBN 5-7230-0196-5.*			
Matthiola tatarica (Pall.) DC. (family Brassicaceae)	Tatar Mattiolas	Levkoy Tatar	A plant up to a meter high with tomentose pubescence, forming woody bushes. Stems are straight or slightly curved, weakly branched, with dense foliage. Leaves are lanceolate, entire or serrated. The flowers are white to mauve or yellow with four petals and a characteristic scent. The flowers are collected in spike-shaped panicles. The fruits are dry, flat pods with protruding tubercles from the seeds. Decorative flowering garden plant with fragrant flowers. Several species are cultivated in open ground; there are decorative varieties suitable for landscaping balconies. *Chernyakovskaya E. G. Genus 614. Levkoy - Matthiola // Flora of the USSR*	The area has not been explored		
West-Kazakhstan region						
Stipa	Kauyrsyn shop	Feather grass	Perennial herbs with a short rhizome, sometimes producing a very large bunch of hard leaves, often rolled into a tube and similar to wire. The inflorescence is paniculate, the spikelets contain one flower each, 2 covering scales, the outer flower turns into a long, mostly bent at the knee and twisted at the base, and tightly clasps the fruit (grain) until it ripens, after which the awn falls off. *Kovyl // Great Soviet Encyclopedia : [in 30 volumes] / ch. ed. A. M. Prokhorov*	The area has not been explored		

Betula	Kayyn	Birch	Most types of birches are trees up to 30 and even 45 m high, with a trunk girth of up to 120-150 cm, some species are shrubs from large to small, even creeping, barely rising above the ground. All representatives of the genus are monoecious, dioecious, wind-pollinated (anemophilous) plants. The bark of most birches is white, yellowish, pinkish or reddish-brown; in some species it is gray, brown or even black. The cavities of the cork tissue cells on the trunks are filled with a white resinous substance - betulin, which gives the bark a white color. *Animals and plants. Illustrated encyclopedic dictionary. - M.: Eksmo, 2007. - P. 117-119.*	The area has not been explored		
Populus	Terek	Poplar	Large trees 40-45 m high (up to 60 m) and a trunk diameter of more than 1 meter. The crown is tent-shaped, ovoid, ovoid-pyramidal or pyramidal. The trunk bark is fissured, brownish-gray or dark gray; branches - smooth, gray or olive-gray. The root system is strong, but mostly superficial, extending far beyond the crown projection. The buds are elongated, covered with several scales, often pointed, and are resinous and fragrant[19]. The leaves are petiolate, alternate, glabrous or pubescent. The shape of the leaf blade varies, it can be: deltoid, heart-shaped, oval, lanceolate, pointed or other, the size and shape of the leaf depends on the shoot on which it is located and on the position on this shoot, the venation is reticulate. The edges of the leaf blade are entire, jagged or serrate. The stomata on the leaves are paracytic. The petioles vary in length from 0.5 to 11 cm, glabrous or pubescent. Some species are equipped with glands at the intersection of the petiole with the leaf blade.[19]. The plant is dioecious, sometimes monoecious, blooms before the leaves appear or simultaneously with them; The ability to bear fruit occurs at 10-12 years. The flowers are collected in cylindrical, erect or pendulous inflo-	The area has not been explored		

			rescences - catkins (spike-shaped racemes), which fall off when the flowers fade or the seeds fall out. *Populus // Botanical dictionary / comp. N. I. Annenkov . - SPb.: Type. Imp. AN , 1878. - XXI + 645 p*			
*Note: + - species detected; 0 – species not found						

Table H.2 – Taxonomic composition of the diversity of terrestrial invertebrates

Latin (scientific name)	Name in state language	Name in Russian	Known for a given territory (indicating source of information)	Discovered (indicating the timing of the research)	Quantity	
1	2	3	4	5	6	
Aktobe region						
Красотел сетчатый	Torkanatty baryldauyk qonyz	*Calosoma reticulatum*	Beetle 20-27 mm long. The color of the head, pronotum and elytra is metallic green, bronze, rarely black with a bronze sheen. The mouthparts, antennae and legs are black. The pronotum and elytra are convex and wide. The fore-back is roughly wrinkled and punctate. The spaces between the elytra form irregular tubercles, often merging in the transverse direction. Primary pits are obvious. *Essay on the reticulate beauty on the Carabidae of the World website*	Not detected		
Тарантулы	Buye	*Lycosa*	Tarantulas are a genus of the wolf spider family. These are large (from 2 to 10 cm) poisonous araneomorphic spiders. Tarantulas live in arid areas - steppes and deserts. During the day, they hide in vertical burrows, the depth of which reaches 60 cm. At night, they climb to the surface and actively move along the ground, hunting for insects. They do not weave trapping nets; the web is used only as a covering for the walls of the burrow and in the construction of the egg cocoon. *Zoology of invertebrates / ed. V. Westheide and R. Rieger. - M.: T-vo scientific publications KMK, 2008.*	Not detected		

Голубянка Татьяна	Tatiana Kogildir Kobelegi	*Otnjukovia tatjana*	A species of butterfly from the blueberry family. The length of the front wing is 11-13 mm. The upper side of the wings in both sexes is dark gray with a greenish-brown tint. The crossvein on the forewing is somewhat darker than the main background. The underside of both wings is light, almost white. The postdiscal row is formed by large black spots. On the hind wing there is an orange band consisting of 6 spots, which are bordered inside and outside by black spots. *Korb S.K., Bolshakov L.V., 2011. Catalog of lepidoptera (Lepidoptera: Papilionoformes) of the former USSR. Second edition, revised and expanded // Eversmanniya. Separate issue 2. Tula. 123 p.*	08.08.23 Discovered	Less than 5	
Truxalis eximia Eichwald	Symbatty Uzynbas	Graceful long head	Found in Western and Southern Kazakhstan. In areas with irrigated agriculture, it lives on the outskirts of cotton fields, orchards, melon fields, alfalfa, along the banks of irrigation ditches, roadsides and wastelands. It feeds on a variety of cereals, hare barley, finger grass, colza, chicory, reed and other plants. Depending on the habitat, they are found in different color variations - green, gray and straw. Maintains on plants (sedges and grasses). *M.K. Childebaev, V.L. Casenas "Orthoptera" 2013-A*	08.08.23 Discovered	Less than 5	

Ochrilidia hebetata (Uvarov)	Kumdy ushtybas	Sandy spearhead	Found in Western Kazakhstan (Mangyshlak, Aktobe). Lives exclusively on sandy grass - seline (Aristida pennata), growing on hilly, ridge and dune sands . The antennae of males and females are slightly flattened in the main part; the length of an individual segment in the apical half of the male antenna is 2 times greater than its greatest width. The body length of the male is 19.0–20.0 mm, that of the female is 29.0–32.4. The size of the elytra in the male is 16.0–17.5 mm, in the female — 25.0–28.2 *Biological and entomological characteristics of locusts of the Eastern Karakum / Bakhar Yusupova. — Text: immediate // Young scientist. - 2022. - No. 42 (437). — P. 22-25* *M.K. Childebaev, V.L. Casenas "Orthoptera" 2013-A*	08.08.23 Discovered	1	
Kyzylorda Region						
Microzegris pyrothoe	Alautusti microzegris	Zorka fiery or Microzegris fiery	A diurnal butterfly from the white butterfly family. The only representative of the monotypic genus *Microzegris* . Zorka fiery is listed in the Red Book of Kazakhstan as a “Dwindling species.” A decline in the number of species is observed everywhere. The species occurs locally, but is common in some habitats. The reason for the decline in numbers is the disappearance of the species’ habitats due to anthropogenic activities. *I. D. Mityaev, R. V. Yashchenko, V. L. Kazenas. The amazing world of invertebrates.*	Not detected		

Catocala optima	Zholakty torangy kobelegi	Turanga sash	Turanga sash is a species of butterfly from the family Erebidae. Endemic to Central Asia. The habitat consists of several broken small parts. Found locally in the deserts of Central Asia. Kazakhstan (floodplain tugai of the Syrdarya (Baigakum and Ili stations), Turkmenistan , Uzbekistan , Tajikistan . Drainage of floodplains, fires, and deforestation of tugai forests negatively affect the population of the species. *Red Book of the Kazakh SSR. T. I. Animals. Ed. 2nd. - Alma-Ata: Gylym, 1991.*	Not detected		
Ischnura aralensis	Aral Sea	Aral slendertail	The Aral slender-tailed dragonfly is a species of dragonfly of the Coenagrionidae family. A small, very delicately built dragonfly. The color is blue-green with a metallic-shiny dark pattern that varies in shape. The ninth tergite of the abdomen is black. A rare, locally widespread species of dragonfly. A representative of the only genus in the CIS, the species of which are characterized by striking polymorphism - the presence of forms that are sharply different in color. Known from two local habitats: in the basin of the lower reaches of the Syrdarya River and in the Southern Urals *A. M. Borodin, A. G. Bannikov , V. E. Sokolov and others - 2nd ed. - M.: Forest Industry, 1984. - P. 240. - 392 p.*	Not detected		

Cladocera	Tarmakty murtshalylar	Cladocera	Small planktonic crustaceans, one of the most widespread and extremely diverse in external structure animals of plankton, benthos and neuston of inland water bodies of all types. In most cladocerans, the body is enclosed in a carapace in the form of a bivalve shell. The carapace valve is slightly open on the ventral side. The carapace completely covers the entire body, the head protrudes forward, often forming, for example, in daphnia , a beak-shaped outgrowth directed towards the ventral side. *Cladocera or water fleas // Encyclopedic Dictionary of Brockhaus and Efron : in 86 volumes (82 volumes and 4 additional). - St. Petersburg, 1890-1907*	Not detected		
Prionyx macula	Azali penetrated	Prionix mourning	Prionyx macula is a rare desert species of burrowing wasps (Sphecidae) from the genus Prionyx. Biology is unknown, presumably, like other species of the genus, they nest in the ground, catching orthoptera insects from the locust family (*Orthoptera* : *Acrididae*). *Pulavsky V.V. Prionyx. P.183-184. In the book: Key to insects of the European part of the USSR, Sphecidae // L., Nauka, 1978 . - T. 3, pp. 120-192.*	Not detected		
Chrotogonus turanicus Kuthy	Turan Chrotogony	Turanian chrotogonus	A desert Central Asian-Kazakh species, found, as a rule, in river valleys. In Kazakhstan, it was found in the Zaisan depression, the Alakol depression, and the valleys of the Ili and Syr-Darya rivers. In Central Asia, it lives mainly in the Amu Darya valley. Inhabits sandy banks of rivers, salt lakes, salt marshes, tugai; Older larvae overwinter under plant debris. Stays on the soil surface. *V.L.Cazenas. Insects of Kazakhstan (main orders).*	Not detected		

Turkestan region						
Latrodectus tredecimguttatus	Karakurt	Karakurt	Karakurt (from Turk. *karakurt* , lit. "black insect) is a species of spider from the genus black widows. The Latin name of the species conveys external morphological characteristics: thirteen points or spots on the upper side of the abdomen. The venom is more dangerous than that of a snake. The bite acts immediately: the injured person feels a burning pain, which within 10-15 minutes spreads throughout the body. Typically, patients complain of unbearable pain in the abdomen, lower back, and chest. *Marikovsky P. I. Black Widow (a story about the poisonous karakurt spider and other arachnids) . - Alma-Ata, 1990.* *Marikovsky P.I. Tarantula and karakurt . - Frunze, 1956.*	Not detected		
Hierodula tenuidentata	Aktenbil douit	Tree mantis	The tree mantis lives in the Black Sea part of Russia, Kazakhstan, Uzbekistan, Tajikistan, Turkmenistan, and India. The species, as its name emphasizes, is associated with tree and shrub vegetation and is most often found in floodplains of rivers, along the valleys of which it rises high into the mountains - up to 1700 m above sea level. *Storozhuk M. N. "The Life of Bogomolov."*	Not detected		

Danaus plexippus	Danaid monarch	Danaid monarch	The monarch butterfly is a species of butterfly from the family *Nymphalidae* . The monarch Danaid adult is easily recognized by the characteristic pattern on the wings: black stripes on a rufous background. Along the edge of the wings there is a wide black border with white spots. The wingspan is 8.9-10.2 cm. Danaid monarchs are similar in size and color to butterflies of another species - *Limenitis archippus* , however, the latter has an additional bordering dark stripe on the back pair of wings. *Striganova B. R., Zakharov A. A. Five-language dictionary of animal names: Insects. Latin, Russian, English, German, French / ed. Doctor of Biology sciences, prof. B. R. Striganova. - M.: RUSSO, 2000. - P. 269. - 1060 copies. — ISBN 5-88721-162-8.*	Not detected		
(Pompilidae, или Psammocharidae)	Zhol aralary nemese pompilider	Road wasps or pompilidae	Road wasps or pompilids (Pompilidae, or Psammocharidae) - family of Hymenoptera insects (Hymenoptera) of the suborder Apocrita. Mostly large or medium-sized insects (15-40 mm). They lead a solitary lifestyle. They dig holes in the ground (some in wood or made of clay), where they lay eggs on spiders paralyzed by stings ,serving as food for the larvae *Striganova B. R., Zakharov A. A. Five-language dictionary of animal names: Insects. Latin, Russian, English, German, French / ed. Doctor of Biology sciences, prof. B. R. Striganova. - M.: RUSSO, 2000. - P. 269. - 1060 copies. — ISBN 5-88721-162-8.*	Not detected		

Jambyl Region						
Acrididae	Shegirtke, acridter	Locusts, locusts	True locusts (capable of forming large swarms (numbering up to hundreds of millions of individuals), migrating over considerable distances. A feature of the biology of the locust is the presence of two phases - solitary and gregarious, differing in morphology and behavioral characteristics *Bey-Bienko G. Ya. , Mishchenko L. L. 1 // Locust faunas of the USSR and neighboring countries // Def. On the fauna of the USSR.. - M.-L.: Publishing house of the Institute of Zool. Academy of Sciences of the USSR., 1951. - T. 38. - P. 1-380..; T. 40. Part 2. pp. 381-667.*	Shegirtke, acridter	Locusts, locusts	
Psocoptera	Pishen zhegiler	Hay eaters	Hay eaters are an order of insects with incomplete metamorphosis. The usual body length of representatives is 0.6-7 mm (up to 10 mm - *Thyrsophorus metallicus*). Currently, scientists have described 5,732 species of hay beetles, including 121 fossil species (Zhang, 2013), most of which live in tropical and subtropical areas *Striganova B. R., Zakharov A. A. Five-language dictionary of animal names: Insects. Latin, Russian, English, German, French / ed. Doctor of Biology sciences, prof. B. R. Striganova. - M.: RUSSO, 2000. - P. 35. - 1060 copies. — ISBN 5-88721-162-8. Zhang, Z.-Q. "Phylum Athropoda". — In: Zhang, Z.-Q. (Ed.) Animal Biodiversity: An Outline of Higher-level Classification and Survey of Taxonomic Richness (Addenda 2013).*	Pishen zhegiler	Hay eaters	

Boreus	Boreidter	Glaciers	A genus of insects from the family of glaciers of the order Scorpionidae. The wings are underdeveloped or completely absent, there are no ocelli, the female has a prominent ovipositor. The antennae are thread-like, rather long, the legs are long, and the eyes are compound. Predatory insects. *Martynova O. M. (1954). Scorpions (Mecoptera) of the fauna of the USSR. 1. Boreidae. — Proceedings of the Zoological Institute of the USSR Academy of Sciences . - Moscow. — Volume 15. P.54-66.* *Penny , Norman S. _ (1977). A Systematic Study of the Family Boreidae (Mecoptera). — Lawrence: The University of Kansas. — Science Bulletin: Vol. 51, No. 5. - Pp. 141-217*	Boreidter	Glaciers	
Sphingonotus nebulosus(Fischer-Waldheim)	Zhartasty shol turkanattysy	Rocky desert; female; brown variation	Sphingonotus nebulosus (Fischer-Waldheim) - Rocky hermit _ Desert-semi-desert Kazakh-Mongolian species. It is divided into 5 subspecies, 3 of which are found in Kazakhstan. S. nebulosus dis-color Uvarov. Distributed in Western (Mangyshlak), South-Eastern (from the Balkhash region to the southern slopes of the Dzhungar Alatau) and Cen-tral Kazakhstan (Betpak-Dala desert), the moun-tains of Central Asia, Iran and Pakistan. S. nebu-losus nebulosus (Fischer-Waldheim) is distributed in central Kazakhstan (up to Mugodzhar in the west), the Zaisan depression, Altai, and the south of the Orenburg steppes; in Northwestern Mongolia and Western China. *Bei-Bienko G.Ya. 1964. Order Or-thoptera - Orthoptera // Key to insects of the Euro-pean part of the USSR. T. 1. M.-L.: Publishing house "Science". pp. 205-284. Berezhkov R.P. 1956. Locusts of Western Siberia. Tomsk: TSU Publishing House. 175 p. Lachininsky A.V., Sergeev M.G., Childebaev M.K. et al. 2002. Locusts of Ka-zakhstan, Central Asia and adjacent territories. Laramie. 387 p.*	Zhartasty shol turkanattysy		

Almaty region						
Chrysolina polita	Zhapyrakzhegish	Leaf beetle	Leaf beetles are found everywhere except Antarctica and most of the Arctic zone. On the territory of the former USSR there are more than 1,500 species, in Siberia alone - over 400. They inhabit almost all zoogeographic regions of the Earth, from reservoirs to high mountains, from deserts to polar islands. *Key to insects of the Far East of the USSR. T. III. Coleoptera, or beetles. Part 2 / under general. ed. P. A. Lera . - L.: Nauka, 1992. - 704 p. — 1400 copies. — ISBN 5-02-025623-4*	Not detected		
Agrillus cuprescens	Zerkonyz	Zlatka	Roseate narrow-bodied borer, or narrow-bodied currant borer (lat. *Agrilus cuprescens*), - vijukov-borer. Harmful to roses, rose hips, blackberries and currants. Flight of beetles in mid-late May; beetles feed on rose and rose hip leaves. *Alekseev A.V. Sem. Buprestidae - Goldweeds. // Key to insects of the Far East of the USSR. T. III. Coleoptera, or beetles. Part 1 / under general ed. P. A. Lera . - L.: Science , 1989. - P. 463-489. — 572 p. — 3150 copies. — ISBN 5-02-025623-4 .*	Not detected		

Mylabris quadripunctata	Mylabris konyzy	Narynivnik	They inhabit mainly steppes, steppe regions and savannas, but can also be found in deserts and semi-deserts. The lifestyle of all species is quite monotonous. Beetles feed on plant flowers. They are active only during the day, in sunny weather. The eggs are laid in the ground. *S.V. Kolov, V.L. Casenas. Blister beetles (Type Arthropods, class Insects). Series "Animals of Kazakhstan in photographs." - Almaty, 2013. - 110 p.*	Not detected		
Calosoma sicophanta	Khosh isisti sulu koңyz	Krasotel fragrant	It is distinguished by its golden-blue-green elytra and the pungent odor that the beetle emits in case of danger. A very active predator, hunts during the day, feeding on caterpillars of moths and silkworms. During the summer period, one beetle destroys 200-300 gypsy moth caterpillars, and the larva destroys about 60 caterpillars and 15-20 pupae. *Striganova B. R. , Zakharov A. A. Five-language dictionary of animal names: Insects. Latin, Russian, English, German, French / ed. Doctor of Biology sciences, prof. B. R. Striganova . - M .: RUSSO, 2000. - P. 103. - 1060 copies. — ISBN 5-88721-162-8 .*	Not detected		

Aporia crataeg	Dolana kobelegi	hawthorn	Hawthorn is distributed throughout Europe, as well as in Northern and Central Asia to the western slopes of the mountains of Eastern Yakutia and Japan. Extinct in England, where its last specimen was caught in 1925, absent from Sardines and Corsica. It is most numerous in North Africa, Morocco and Algeria. *Striganova B. R., Zakharov A. A. Five-language dictionary of animal names: Insects. Latin, Russian, English, German, French / ed. Doctor of Biology sciences, prof. B. R. Striganova. - M.: RUSSO, 2000. - P. 103. - 1060 copies. — ISBN 5-88721-162-8.*	Not detected		
Kostanay region						
Nymphalidae	Nymphalider	Nymphalidae	Nymphalidae (lat. Nymphalidae) - family Lepidoptera , consisting of about 6,100 species. The name of the family was first given by the German zoologist, botanist and specialist in Mesoamerican languages, Constantin Samuel Rafinesque-Schmaltz . The main distinguishing feature of representatives of the nymphalid family is the shortened front pair of legs. *Gornostaev G. N. Insects of the USSR. - Moscow: Mysl, 1970. - 372 p. — (Reference books for geographers and travelers).*	08/07/23 discovered	1 PC.	

(Satyridae)	Satyridter	Satyrids	Satyrids or marigolds or satyrs (lat. Satyridae) are a family of daytime butterflies . Worldwide distribution. There are about 2,400 species in the world fauna, about 350 in the Palearctic. The peculiar “jumping” flight makes it difficult for birds to pursue butterflies. In addition, they have a protective color. *A.B. Zhdanko, V.L. Casenas. Butterflies: Nymphalids and Satyrids (phylum Arthropods, class Insects). Series “Animals of Kazakhstan in photographs.” - Almaty, 2013. - 121 p.*	Not detected		
Poecilimon intermedius (Fieber)	Shygys arakuyrygy	Eastern sawtail.	Poecilimon intermedius (Fieber) – Sawtail eastern _ Northern steppe European-Central Siberian species. Lives in Northern, Central, Eastern and South-Eastern Kazakhstan (Kostanay, Burabay resort and further to south to the central part of the Kazakh small hills, mountains Tarbagatai, Dzungarian Alatau, ridge. Ketmen), for outside Kazakhstan - in Russia (middle zone European part, Western and Eastern Siberia) and Kyrgyzstan (Bishkek, Karakol). *Kurt Harz. Die Orthopteren Europas. Band 1, Dr. W. Junk NV, Den Haag 1969.* *Lachininsky A.V., Sergeev M.G., Childebaev M.K. et al. 2002. Locusts of Kazakhstan, Central Asia and adjacent territories. Laramie.*	08/07/23 Discovered	Less than 5	

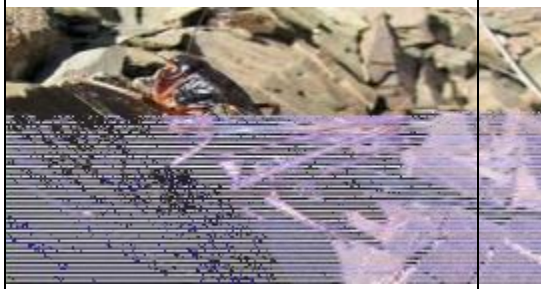
Abay region						
Mylabris smaragdina Gebler	Kok-zhasyl koңyz	Emerald blister	The body is metallic green, with protruding gray hairs. The antennae are club-shaped, 10-segmented, the third segment is twice as long as the fourth. The pronotum in front of the apex is flattened, in rather rare, rough, but indistinct points, shiny. The segments of the fore tarsus are elongated-triangular. *S.V. Kolov, V.L. Casenas. Blister beetles (Type Arthropods, class Insects). Series "Animals of Kazakhstan in photographs." - Almaty, 2013. - 110 p.*	Not detected		
Hycleus khodjenticus Ballion	Khojent qonyzy	Narynvnik Khodzhent	The beetles are active from late April to early August. They feed on chingil, brunette, mint, sage, jaundice, tartar, chicory, dandelions, yarrow, bindweed, eremurus, poppy, lilac and other plants. It is noted as a pest of a number of agricultural crops. Eggs are laid in very dense and moist soil. *S.V. Kolov, V.L. Casenas. Blister beetles (Type Arthropods, class Insects). Series "Animals of Kazakhstan in photographs." - Almaty, 2013. - 110 p.*	Not detected		
Archips podana Scop.	Zhapyrak shiratkysh kobelekter	Leaf roller - plump omnivore	Young caterpillars feed mainly at the ends of shoots, between woven budding leaves; older caterpillars roll or weave leaves. Leaves (of young plants in nurseries or plantations, less often of older trees) are skeletonized (part of the leaf may be rolled up). *A.B. Zhdanko, V.L. Casenas. Butterflies: Nymphalids and Satyrids (phylum Arthropods, class Insects). Series "Animals of Kazakhstan in photographs." - Almaty, 2013. - 121 p.*	02.08.23 Discovered	Less than 5	

Akmola region						
Muschampia cribrellum)	Torly kalyn bass	Lattice beetle	The lattice butterfly (lat. Muschampia cribrellum) is a butterfly from the fathead family. Develops in one generation per year. Flight time is observed from mid-May to early August. Butterflies fly in circles over areas of flowering vegetation, feeding on the nectar of herbaceous plants such as Veronica, Vicia, Thymus, etc. Males exhibit territorial behavior. The caterpillars feed on bloodroot (Potentilla) and hibernate. *Czernay A. _ Verzeichniss der Lepidopteren des Charkowschen , Poltawschen und Ekaterinoslawschen gouvernements // Bull . Soc . Natur. - Moscow, 1854. - Issue. 27. - No. 7. - P. 212-225*	Not detected		
Saga pedo (Pallas)	Dala Kergisi	Steppe dybka	European-Kazakh steppe species. Distributed in Northern, Central, Southern and South-Eastern Kazakhstan, the steppe zone of the European part of Russia. Inhabits meadow areas, floodplains of rivers and streams. It reproduces parthenogenetically, i.e. without the participation of males. *Nurmuratov T.N., Azhbenov V.K., Kambulin V.E. et al. 2000. Locust pests of agricultural plants in Kazakhstan and recommendations for limiting their numbers. Almaty: Asia Publishing. 56 s*	Not detected		

Mongoloraphidia Raphidiidae	Mongoloraphidia tuyesi	Camel Mongoloraphidia	A small order of medium-sized insects (15-20 mm) with complete metamorphosis. Camels got their name due to some similarity in profile with a camel. Camels are moisture-loving, usually associated with tree and shrub vegetation. Adults live openly in trees and are active in summer. They hunt dipteran larvae, caterpillars, aphids, and bark beetle larvae. *Aspöck H. The biology of Raphidioptera: A review of present knowledge (English) // Acta Zool. Acad. Sci. Hungaricae: journal. - 2002. - Vol. 48, no. suppl. 2. - P. 35-50. Archived from the original on October 27 , 2005 . Archival copy dated October 27 , 2005 on the Wayback Machine*	Not detected		
Atyrau region						
Mylabris undecimpunctata Fischer-Waldhei	On bir nukteli zerkonyz	Eleven-spotted blister	The elytra are bright red, covered in short light hairs, giving them a silky shine, with rounded black ocellated spots arranged in the order 2: 2: 2. A light, soft fawn rim is visible around the spots *S.V. Kolov, V.L. Casenas. Blister beetles (Type Arthropods, class Insects). Series "Animals of Kazakhstan in photographs." - Almaty, 2013. - 110 p.*	The area has not been explored		
Solifugae	Tuye Ormekshi	Phalanx (salpuga)	Salpugs are quite large arachnids. The Central Asian salpuga, for example, reaches a length of 5-7 centimeters. Their body and limbs are covered with long hairs. The pedipalp tentacles, located in the front, are very similar to limbs and perform their function. *Byalynitsky-Birulya A. A. Arachnids. Phalanges (Solifuga). New episode. 17. Fauna of the USSR. Volume 1. Issue 3. Moscow - Leningrad: Publishing House of the USSR Academy of Sciences, 1938. - 178 p.*	The area has not been explored		

Hycleus tekkensis	Tekindik zerkonyz	Tekin blister	Body black. The pronotum is strongly shiny, unevenly and finely punctured, with short light hairs. Drawing in the form of slings; the spot on the humeral tubercle is often separated from the outer edge of the anterior sling, its outlines are vague; this bandage is sometimes split into two spots. *S.V. Kolov, V.L. Casenas. Blister beetles (Type Arthropods, class Insects). Series "Animals" Kazakhstan in photographs". - Almaty, 2013. - 110 p.*	The area has not been explored		
West-Kazakhstan region						
Kretania pylaon	Pilaon kogildir kobelegi	Blueberry Pilaon	A diurnal butterfly from the blueberry family. Butterflies readily feed on flowering plants; they were especially often observed on astragalus and alfalfa. They often stay in ravines along sandy and clayey areas of the southern slope. Sometimes it is a widespread species in steppe ravines. *Morgun D.V., Dovgailo K.E., Rubin N.I., Solodovnikov I.A., Plyushch I.G. Day butterflies (Hesperioidea and Papilionoidea, Lepidoptera) of Eastern Europe. CD identifier, database and Lysandra software package. - Minsk, Kyiv, M.: 2005.*	The area has not been explored		

Aricia agestis	Kongyr kogoldir kobelek	Brown blueberry	In the predominant part of its range in Eastern Europe, two generations develop per year. The flight time of the first generation butterflies occurs from mid-May to mid-June, the second generation - from early July to mid-August. In hot years, a third generation can also develop, the butterflies of which fly in September, and in the south - until October inclusive. Eggs are laid by females on the underside of the leaves of food plants, closer to the central vein. *Morgun D.V., Dovgailo K.E., Rubin N.I., Solodovnikov I.A., Plyushch I.G. Day butterflies (Hesperioidea and Papilionoidea, Lepidoptera) of Eastern Europe. CD identifier, database and Lysandra software package. - Minsk, Kyiv, M.: 2005.*	The area has not been explored		
Helix pomatia	Zhuzim uluy	Grape snail	The species has settled in all but northern parts of Europe, including the Baltic Sea coast. It lives in thickets of bushes, on light forest edges, in gardens and parks. The snail is active from spring until the first cold weather, after which it burrows into the soil. *Dogel V. A. Zoology of invertebrates: Textbook for high school universities - 7th ed., revised. and additional - M.: Higher School, 1981-606 p. — ISBN 978-5-903034-46-8*	The area has not been explored		
Mangystau region						

Sphingonotus nebulosus	Zhartasty shol turakanatysy	Rock desert	Semi-desert Kazakh-Mongolian species with an optimal range in the desert zone. Western (Mangyshlak), South-Eastern (from the Balkhash region to the southern slopes of the Dzhungar Alatau) and the south of Central Kazakhstan (Betpak-Dala desert). *M.K. Childebaev, V.L. Casenas. Orthoptera (Type Arthropods, class Insects). Series "Animals" Kazakhstan in photographs". - Almaty: "Nur-Print", 1913. -127 p.*	The area has not been explored		
Montana decticiformis (Stshelkanovtzev)	Montana detectionformis	Montana decticiformis.	Discovered in the Karatau Mountains in Mangyshlak. It is found on coarse screes, on rocks, among stones. *M.K. Childebaev, V.L. Casenas. Orthoptera (Type Arthropods, class Insects). Series "Animals" Kazakhstan in photographs". - Almaty: "Nur-Print", 1913. -127 p.*	The area has not been explored		
Culex pipiens	Kadimgi masa	Squeak mosquito or common mosquito	Most mosquitoes found range in size from 3 to 7 mm. Females feed on plant juices (to maintain life) and blood (to develop eggs), mainly from humans, while the male feeds exclusively on plant juices. Female common mosquitoes are carriers of various human diseases: for example, Japanese encephalitis, meningitis, as well as animals, such as avian malaria. *Mamaev B. M., Medvedev L. N., Pravdin F. N. Key to insects of the European part of the USSR. - M.: Education, 1976. - P. 261. - 304 p.*	The area has not been explored		
East Kazakhstan region						

Cicindela clypeata	Zhylky konyzy	Jumping beetle	Jumping beetles are predators, the veritable cheetahs of beetles, with keen eyesight and fast legs for stalking prey. They move in fast jumps. If they were the size of a person, they could reach speeds of 200-300 km/h. *Tiger Beetles of Alberta: Killers on the Clay, Stalkers on the Sand by John Acorn. University of Alberta Press, 2001.* *David L. Pearson, C. Barry Knisley and Charles J. Kazilek. A Field Guide to the Tiger Beetles of the United States and Canada. - Oxford University Press, 2005 (first edition), 2015. - ISBN 0-1993-6716-7. — ISBN 978-0-19-936716-0.*	Zhylky konyzy		
Epicauta erythrocephala Pallas	Kyzyl bass Shpanka	I'm a red-headed span-dex	The species is widespread in Kazakhstan - in deserts, semi-deserts and steppes throughout the flat part of the Republic and foothills. The beetles are active from late May to early August, often forming large clusters. Adult food plants: solyanka, petrosimonia, brunette. Feeding has also been observed on agricultural crops: potatoes, alfalfa, soybeans, melons, and, less commonly, grains and cotton. *S.V. Kolov, V.L. Casenas. Blister beetles (Type Arthropods, class Insects). Series "Animals of Kazakhstan in photographs." - Almaty, 2013. - 110 p.*	Kyzyl bass Shpanka		

Euzonitis bipunctata Piller et	Ekidakty zerkonyz	Two-spotted blister	The elytra are ocher or brownish-yellow, each with two spots (the apex without a spot); less often the elytra are uniformly yellow. Pronotum matte, densely punctate. The species is distributed in the south of the European part of Russia and in Kazakhstan (center, east and southeast). Inhabits steppe biotopes. Beetles are active in May-July. *S.V. Kolov, V.L. Casenas. Blister beetles (Type Arthropods, class Insects). Series "Animals of Kazakhstan in photographs." - Almaty, 2013. - 110 p.*	02.08.23 Discovered	Less than 10	
Cheiracanthium punctorium	Sary Ormekshi	Yellow sak	The yellow-sac stitching spider, called the yellow sak, is found in the southern regions of Kazakhstan and appears in the East Kazakhstan region. Reaches 1.5 cm in size. Leads a nocturnal lifestyle. When hunting, it does not spread nets, but jumps on the back of an insect and injects poison. The spider creates a home in the form of a cocoon, which can hang in the grass or on stones. *Byalynitsky-Birulya A. A. Arachnids. Phalanges (Solifuga). New episode. 17. Fauna of the USSR. Volume 1. Issue 3. Moscow - Leningrad: Publishing House of the USSR Academy of Sciences, 1938. - 178 p.*	02.08.23 Discovered	1	
Zhetysu region						

Mylabris crocata Pallas	Saffron grains	Saffron blister	The elytra are orange-red, each usually with 6, but sometimes with 5 small black spots. In Kazakhstan, one of the most widespread and common species. Ecologically flexible species, found from deserts to mid-mountains. The beetles are active from late April to mid-September. Feeding on chicory, cornflower, tulips, tulips, chondrillus, bindweed, chingil, astragalus, and poppies was noted; registered as a pest of agricultural crops. *S.V. Kolov, V.L. Casenas. Blister beetles (Type Arthropods, class Insects). Series "Animals of Kazakhstan in photographs." - Almaty, 2013. - 110 p.*	Not detected		
Agelena labyrinthica	Agelen labyrinth Ormekshi	Agelena (labyrinth spider)	The labyrinth spider is distributed throughout the Palearctic. They prefer dry, open-air landscapes with low vegetation, such as dry grassland, heathland, roadsides and shrubland *Byalynitsky-Birulya A. A. Arachnids. Phalanges (Solifuga). New episode. 17. Fauna of the USSR. Volume 1. Issue 3. Moscow - Leningrad: Publishing House of the USSR Academy of Sciences, 1938. - 178 p.*	Not detected		
Ctenopus melanogaster Fischer-Waldheim	Karakaryndy zer konyz	Black-bellied blister	The head and pronotum are uniformly yellow-red, elytra matte, very finely punctate, densely hairy. The entire scutellum (or just its apex), The chest and part of the abdomen are black. The species is distributed to Caucasus, Central Asia and Kazakhstan. Known from surroundings of Zharkent **.** *S.V. Kolov, V.L. Casenas. Blister beetles (Type Arthropods, class Insects). Series "Animals of Kazakhstan in photographs." - Almaty, 2013. - 110 p.*	Not detected		

Karaganda region						
Agrilus viridis	Zhinishkedeneli altyn konyz	Narrow-bodied borer, or green borer	Type species of the genus Narrowgrass. The body length of adult insects (imago) is 5-9 mm. The coloring is varied and changeable. They develop on various deciduous trees. Occasionally they can act as pests of crop production and forestry *Alekseev A.V. Sem. Buprestidae - Goldweeds. // Key to insects of the Far East of the USSR. T. III. Coleoptera, or beetles. Part 1 / under general ed. P. A. Lera . - L.: Science , 1989. - P. 463-489. — 572 p. — 3150 copies. — ISBN 5-02-025623-4 .*	Not detected		
Pyrrhocoris apterus	Sarbaz qonyzy, kanatsyz qyzyl qonyz	Soldier bug, wingless red bug, cossack bug, or red bug	Found from March to October in grass, bushes and tree trunks. Soldier bugs eat pollen, fruits, juices and seeds of nearby plants. In addition, their diet includes arthropods and other invertebrates such as worms and snails. The common species dominates in numbers among all true wasps at the end of summer. *Red bug // Great Soviet Encyclopedia : in 66 volumes (65 volumes and 1 additional) / ch. ed. O. Yu. Schmidt . - M.: Soviet Encyclopedia , 1926-1947.*	Not detected		
Vespula vulgaris	Karapayim Aralar	Common wasp	Creates some of the largest colonies among true wasps (one colony can contain over 5,000 worker wasps and about 15,000 cells) and expresses strong variation among females of different caste groups. The body is black, with yellow spots on the chest and extensive yellow areas on the abdomen. *Chauvin R. From bee to gorilla. - M.: Mir, 1965. - 295 p .*	Not detected		

Pavlodar region						
Angaracris barabensis (Pallas)	Barabin turakkanatysy	Barabinskaya, or red-legged ratchet	South-steppe Kazakh-Mongolian species with an optimum range in the steppe zone. Northern and Central Kazakhstan: Kostanay, Pavlodar region, Irtysh steppes, Kent mountains, Karsakpai plateau. – Russia: south of Siberia to the Amur region; Mongolia; Northern China. Damages pasture vegetation. It feeds mainly on kochia, as well as caragana. *M.K. Childebaev, V.L. Casenas. Orthoptera (Type Arthropods, class Insects). Series "Animals" Kazakhstan in photographs". - Almaty: "Nur-Print", 1913)*	Not detected		
Simuliidae	Shirkey	Midges	Midges are dark insects, 2-4 millimeters long. Their mouthparts are of the piercing-sucking type. The eyes are large and faceted. Short, thick antennae consist of 22 segments. The chest is humpbacked. Three pairs of short legs and one pair of wide, large wings are attached to the chest. *Chauvin R. From bee to gorilla. - M.: Mir, 1965. - 295 p .*	Not detected		
North-Kazakhstan region						
Mylabris quadripunctata Linnaeu	Tort nukteli zerkonyz	Four-point blister	Beetle up to 9-14 mm long. The body and head are black, often with a bluish tint. The pronotum is densely punctate, with long silvery and black hairs, with a predominance of light hairs. The elytra are rusty brown. brownish-yellow or red with a black pattern, including 2 humeral, 2 median, 3 preapical spots on each elytra and a narrow black border at the apex. The spots may merge to form a band, and sometimes disappear. *S.V. Kolov, V.L. Casenas. Blister beetles (Type Arthropods, class Insects). Series "Animals of Kazakhstan in photographs." -*	Not detected		

			Almaty, 2013. - 110 p.			
Pieris rapae	Shalkan akubasy	Turnip or white turnip	Close to cabbage (*Pieris brassicae*), but smaller. The length of the fore wing is 22–30 mm. Wingspan 40-50 mm. The color is white. The forewing has a black tip and one in the male, or two in the female, blackish spots. The apical spot is paler than that of the cabbage, and does not extend beyond the middle of the outer edge of the wing. *G. G. Yakobson . Repnitsa // Encyclopedic Dictionary of Brockhaus and Efron : in 86 volumes (82 volumes and 4 additional). - St. Petersburg, 1890-1907.*	Not detected		
Gampsocleis glabra (Herbst)	Zhalanash shegertke	The grasshopper is naked.	Steppe European-Siberian species. Distributed in Western Europe, the southern half of the European part of Russia, the Caucasus, Kazakhstan and the south of Western Siberia. Inhabits Northern, Central, Eastern, South-Eastern and Southern Kazakhstan. Usually settles in dry meadows, forest clearings and other open places. Stays on plants. Mixed meals *M.K. Childebaev, V.L. Casenas. Orthoptera (Phylum Arthropods, class Insects). Series "Animals of Kazakhstan in photographs." - Almaty: "Nur-Print", 1913. - 127 p.*	Not detected		

Ulytau region						
Polyommatus thersites (Cantener)	Thersitis kogildiri	Blueberry thersites	Butterflies fly from mid-May to early September, flying in two generations. They prefer to stay in open spaces. The length of the fore wing is 13-17 mm. The male's wings are violet-blue on top, with a clear purple tint. A narrow dark line runs along the outer edge of the wings. The lower surface of the wings is ash-gray, the forewing has a clearly visible discal spot and a complete row of post-discal spots in a white margin. *Korshunov Yu. P. Keys to the flora and fauna of Russia // Mace Lepidoptera of Northern Asia. Issue 4. - M.: Partnership of Scientific Publications KMK, 2002. - P. 159.*	The area has not been explored		
Hesperiidae	Kalynbastylar	Fatheads	Fatheads (lat. Hesperiidae) are a family of butterflies, the representatives of which, although they belong to the group of daytime butterflies (Rhopalocera), are sharply different from other daytime butterflies. More than 4100 species. Known in fossil form from the early Eocene *Bell E. _ L. _ 1946. A catalog of the Hesperioidea of Venezuela . — Boletin de Entomologia de Venezuela 5(3/4): 65-203.*	The area has not been explored		
Cerocoma schreberi Fabricius	Tuyindi zerkonyz	Blister knotweed	The upperparts are metallic blue or green. The male's antennae are severely deformed and red; the female's are club-shaped and black. The male has all the legs red, the female has only the 3rd and 4th segments of the legs are red. *S.V. Kolov, V.L. Casenas. Blister beetles (Type Arthropods, class Insects). Series "Animals of Kazakhstan in photographs." - Almaty, 2013. - 110*	The area has not been explored		

			s.			
Phaneroptera falcata (Poda)	Kadymgi zhazbalykanatty	Common platewing	Lives in meadows, banks of reservoirs, forest edges. Specialized phytophile, i.e. The species is adapted to living on plants. Often found on flowers *M.K. Childebaev, V.L. Casenas. Orthoptera (Phylum Arthropods, class Insects). Series "Animals of Kazakhstan in photographs." - Almaty: "Nur-Print", 1913. - 127 p.*	The area has not been explored		
*Note: + - species detected; 0 – species not found						

Table H.3 – Taxonomic composition of terrestrial vertebrate diversity

Latin (scientific name)	Name in state language	Title in Russian	Known for the given territory (indicating the source) information)	Discovered (indicating the timing of the re-search)	Quantity	Note
1	2	3	4	5	6	
Aktobe region						
Yellow-eyed Pigeon	Konyr kepter	Brown pigeon	The brown pigeon is a rare breeding migratory bird. Inhabits turanga groves and tugai thickets, or clay faults and old burial grounds on the plains. On migration it is found in open spaces, mown fields and forest belts. In spring, it appears in flocks of up to ten birds. At Chokpak station, brown pigeons were caught during the spring migration from March 24 to May 19. It nests in separate pairs or loose colonies of up to 15-20 pairs. The nest is built on a tree or in a hole in a clayey fault. Laying of 2 eggs occurs from May to mid-July. *Gavrilov E. I. "Fauna and distribution of birds of Kazakhstan." Almaty, 1999.*	08.08.23 Discovered		

Aquila nipalensis	Dala kyrany	steppe eagle	Total length 60–85 cm, wing length 51–65 cm, wingspan 220–230 cm, bird weight 2.7–4.8 kg. Females are larger than males. The color of adult birds (four years old and older) is dark brown, often with a reddish spot on the back of the head, with black-brown primaries, where there are gray-brown streaks at the base of the internal webs; the tail feathers are dark brown with gray transverse stripes. The iris is nut-brown, the beak is grayish-blackish, the claws are black, the wax and legs are yellow. In the first annual plumage, young birds are pale brownish-buff with buffy streaks and rump; The tail feathers are brown with buffy edges. *Koblik E. A. Part 1 // Diversity of birds (based on materials from the exhibition of the Zoological Museum of Moscow State University*). - M.: Moscow State University Publishing House, 2001.	08.08.23 Discovered		
Emys	Batpak tasbakasy	Swamp turtle	Lives in forest, steppe and forest-steppe areas. It is found in various fresh water bodies: swamps, ponds, lakes, floodplains, oxbow lakes, slow-flowing rivers, canals... Swims and dives well, can remain under water for a long time. Under normal conditions, turtles swimming and feeding in a reservoir come to the surface every 15-20 minutes. But in the experiment, turtles survived up to two days in water at a temperature of +18 °C without access to air. *Bannikov A. G., Darevsky I. S., Ishchenko V. G., Rustamov A. K., Shcherbak N. N.* Key to amphibians and reptiles of the fauna of the USSR.	Not detected		
Kyzylorda Region						

Cyrtopodion caspium	Caspian geckos	Caspian gecko	The length of the body reaches up to 8 cm, the length of the tail - up to 10 cm. The skin color on top is pale sand-gray with 5-6 irregular transverse stripes on the neck and body. This gecko also has 8-12 stripes on its tail. The top of the head is spotted or has vague stripes. The ventral side is white. The body and head are flattened. The tail scales are arranged in segments, with a longitudinal row of strongly expanded scutes standing out from above. The entire dorsal side of the body is covered with large triangular tubercles]. Males, unlike females, have femoral pores and a somewhat more massive head. During the mating season, males are colored more brightly and contrastingly, which was determined by the administration of gonadotropic hormone. *Ananyeva N. B. , Orlov N. L. , Khalikov R. G. , Darevsky I. S. , Ryabov S. A. , Barabanov A. V.* Atlas of reptiles of Northern Eurasia	. Not detected		

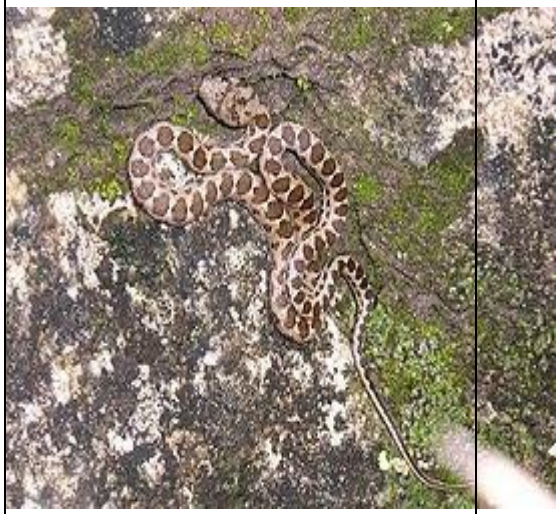
Ablepharus desert	Shol zhalankozi	Desert Holoeye	A small lizard with a body length not exceeding 5.6 cm and a weight of up to 2 g. There are 2 parietal scutes. The eye is surrounded by granular scales that are absent in its lower part. There are no separate eyelids. The upperparts are grayish or grayish-olive. Dark intermittent stripes may be present on the back. Dark brown stripes stretch from the nostril through the eye and further along the sides of the body. It is found on the plains and in the mountains, living in the foothills. Inhabits clayey and rocky areas, wastelands, gardens, vineyards, forest areas in the mountains. It takes refuge in cracks in the soil and in voids between stones, rodent burrows and tree hollows. Active during the day. After wintering it emerges in April - March. They go to winter in October - November. Feeds on insects. Mating in April - early May. Several clutches per season. The length of the eggs is 0.8-0.9 cm. Young ones are 1.5-2 cm long. *Bannikov A. G., Darevsky I. S., Rustamov A. K. Amphibians and reptiles of the USSR / ed. prof. A. G. Bannikova. - M.: Mysl , 1971. - P. 140-141. — 303 p.*	Not detected		
Riparia riparia	Zhar karlygashy	Shore swallow	The color of the top is dark brown, the bottom is white, with a brown transverse stripe on the chest. The tail cut is shallow. The beak is black, the legs are brown. Rare feathers grow on the tarsus. From a distance it can be confused with a city swallow; it differs from it in its dark lower back and dark stripe on its chest. The male and female do not differ in appearance, there are no seasonal differences in color. Juveniles are similar to adults, but have a scaly pattern on the dark top formed by ocher edges on the feathers. Weight 11-16 g, length 12-14, wing 9.7-11.5, span 28-30 cm . *Koloyartsev M. V. Swallows*	Not detected		

Bucephala clangula	Susyldak	Gogol	Common breeding migratory bird. Inhabits fish forest lakes and slow-flowing rivers, both in the steppe and in the mountains at altitudes up to 1700-1750 m in Altai. Appears very early, in the southern regions it flies from the end of February to the middle or end of April, in the northern regions it appears from April to the middle or end of May. It flies day and night in flocks of 10-30, rarely up to 100 birds. It nests in separate pairs in tree hollows (poplar, birch, larch) at a height of 2-10 m from the ground, and very rarely on the ground, between tree roots or in rocks. It settles in artificial nesting boxes (birdhouses) without any problems. The female cleans out the hollow of the old nest. The nesting bowl is lined only with down. *Kustar. Mektep encyclopedias, 2010, Kovshar Anatoly Fedorovich, ISBN 978-601-282-168-0 , 352 bet, Almaty: Atamura*	07/29/23 Discovered		

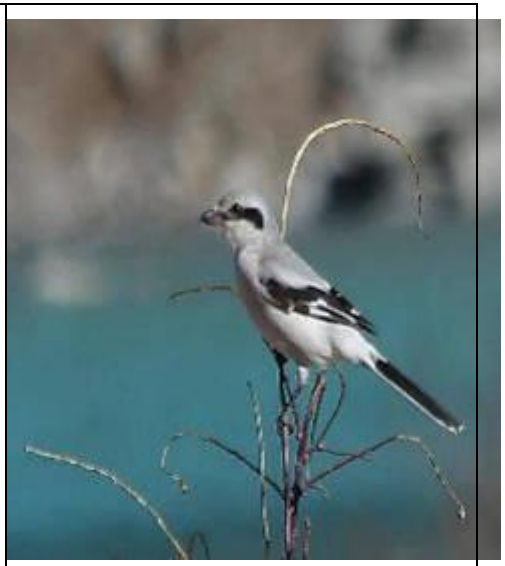
Turkestan region						
Eryx tataricus	Shygys aidarshasy	Eastern boa	Representatives of this species reach a length of 1 m, with females usually 5-10 cm longer than males. The length of the cubs is 150-200 mm. The tail is blunt and rounded, 60-80 mm long. The body color on top is brown with a yellowish-reddish or gray tint; black-brown spots can be found on the back, dark spots and specks on the sides. The belly is most often also covered with black-brown spots, less often it is light without spots. The species of snake from the family Boidae. Distributed from the eastern coast of the Caspian Sea to southern Mongolia, western China and northwestern India. Listed in the Red Book of Turkmenistan as a species with a limited range (category III)] *Ananyeva N. B. , Borkin L. Ya., Darevsky I. S. , Orlov N. L. Five-language dictionary of animal names. Amphibians and reptiles* .	Not detected		
Crossobamon	Tobeli geckodar	Crested geckos	Body length up to 15 cm, head and body flattened. The fingers are straight, their ends are not widened, the bottom is covered with one longitudinal row of plates, and the sides are trimmed with a fringe of long conical scales. The small polygonal scales of the back have a short longitudinal rib in the middle; Between these small ones there are larger round and ribbed ones. The tail scales are arranged in more or less regular transverse rows [2]. The tail is unbreakable and thin. The pupil is vertical with jagged edges. *Shcherbak N. N. , Golubev M. L. Geckos of the fauna of the USSR and neighboring countries*	Not detected		

Melanitta fusca	Kadimgi turpan	Turpan	A large sea duck with a thick neck and a wedge-shaped head. The male has velvety black plumage, with a small semicircular white spot under the white eye. The beak, slightly swollen at the base, is orange-yellow with dark edges on the beak and with a black swelling at the forehead and an orange nail. The paws are crimson-red with black membranes. The eyes of the male are white, the eyes of the female are dark. After the summer molt, the black plumage of the male acquires a brownish tint, without shine. The female is dark brown, with two blurry whitish spots on her cheek, very similar to the female humpbacked scoter, but somewhat lighter. The young are similar to females, but slightly "pockmarked". One-year-old males are brownish-black, without a light spot under the eye, with a "female" light spot near the beak and gray eyes. In all plumages, flying scoters are clearly distinguished from blue scoters by the white mirror on the secondaries, clearly visible above and below. The male differs from the male humpbacked scoter in the shape of its head and beak; the female is unidentifiable from a distance. Length 51-58, span 90-100 cm; weight 1.4-1.9 kg. *Boehme R. L. , Flint V. E.* Five-language dictionary of animal names. Birds. Latin, Russian, English, German, French / Under general. ed. acad. V. E. Sokolova . - M.: Russian language , RUSSO, 1994.	Not detected		
Jambyl Region						

Circus cyaneus	Tuz kuladyny	Harrier	The bird of prey is of medium size and light build - length 46-47 cm, wingspan 97-118 cm. Like other representatives of its genus, it stands out for its long wings and tail, thanks to which it moves slowly and silently low above the ground. Females look noticeably larger than males - their weight is 390-600 grams, while the weight of males is 290-390 grams. In color bright expressed sexual dimorphism *US Department of Agriculture, Forest Service - Circus cyaneus*	Not detected		
Elaphe sauromates	Sarmat Zhylany	Sarmatian snake	The average length of adult specimens is 1.2–1.5 m, large specimens can reach 2 m. The dorsal side of adult snakes is brownish-yellow with rows of longitudinal dark spots. In the middle of each light scale there is a dark spot. The ventral side is lighter, monotonous - from pale yellow to bright yellow and orange. *Ananyeva N. B. , Orlov N. L. , Khalikov R. G. , Darevsky I. S. , Ryabov S. A. , Barabanov A. V. Atlas of reptiles of Northern Eurasia*	Not detected		
Almaty Region						

Ciconia ciconia	Ak tyrna	White stork	The white stork is the most famous of the storks. It is a white bird with black wing tips, a long neck, a long, thin, red beak and long reddish legs. When the stork's wings are folded, it appears that the entire back of the stork's body is black. Hence its Ukrainian name - Chernoguz. Females are indistinguishable from males in color, but somewhat smaller. The height of the white stork is 100-125 cm, the wingspan is 155-200 cm. The weight of an adult bird reaches 4-5 kg. The average lifespan of a white stork is 20 years. Weight 2.2-4.4 kg, length 100-115, wing 54.2-64.5, span 195-215 cm. *Beycek V., Stastny K. Birds. Illustrated encyclopedia. - M.: Labyrinth-press, 2004. - 288 p.*	Not detected		
Hemorrhois nummifer	Korgasyn Zhylany	Lead runner	The total length reaches 120-160 cm. The head is clearly demarcated from the thin neck. The tip of the muzzle is bluntly rounded. The upper side of the body is brownish-gray or grayish-brown in color. The drawing is very changeable. A number of brown, brownish-brown or almost black, transverse or oblique stripes run along the back; in some places they merge into one continuous zigzag stripe. Small spots of the same color run in 1-2 rows on the sides of the body. On the upper side of the head there are small, light-edged spots that form a regular pattern. The underside of the body is grayish-white or pink with dark spots. U young individuals belly yellowish pink . _ *Clark, Richard 2000. Herpetological notes on the islands of Lipsi and Agathonisi, Dodecanse, Greece. Herpetological Bulletin (74): 6-7.*	Not detected		

Oenanthe isabellina	Shybzhyn tashmymshyk	Wheatear	The dancing wheatear is somewhat larger than the common wheatear, longer-legged, large-headed and short-tailed. The coloring of the male and female is similar, light grayish-ochre. Males are usually distinguished from females by a more distinct dark frenulum, but some females also have quite dark frenulum. Seasonal color changes are insignificant. Juveniles are darker than adults, have dark and light buffy streaks on top, a brownish scaly pattern on the chest, and are most reliably distinguished from young wheatears of other species by the pattern of the tail. The tail in all plumages has a wide dark brown apical stripe, occupying about half the length of the tail. Manners are generally similar to those of other wheatears; when looking around, they often take a vertical pose. Weight 22-38 g, length 15-18, wing 8.9-10.6, span 28-32 cm. *Assessment of the possible role of the dancing wheatear (Oenanthe isabellina) and other birds in the mechanism of enzootic plague / N. V. Popov, A. A. Sludsky, E. V. Zavyalov, A. I. Udovikov, V. G. Tabachishin, V. V. Anikin, N. P. Konnov // Volga Ecological Journal. 2007. No. 3. P. 215-226.*	Not detected		
Zhetysu region						

Lanius excubitor	Elken taganak	Gray Shrike	The throat, chest, abdomen, sides and undertail are whitish, gray or brownish-gray and in this case with a streaky thin transverse pattern. In adult females, the coloring is the same, but all tones are duller and more gray; on the underside there is always a well-defined brown streaky transverse pattern. There are females, apparently old, outwardly indistinguishable from males. The young are similar to females, but even grayer; their dark transverse pattern is more developed not only on the underside of the body, but also on the head and back. The beak and legs are black, the iris is brownish-brown. Weight 54.5-88.6 grams, males wing – 102.0-123.0, tail 105.0-125.0, females – wing 104.0-115.5, tail 105.0-130.0. *Dementyev G.P., Gladkov N.A. Volume 6 // Birds of the Soviet Union. - Moscow: Soviet Science, 1954. - 754 p.*	Not detected		
Upupa epops	Babisek	Hoopoe	The bird is slightly larger than a starling and has a very unique appearance. The head and body are brownish-buffy; on the head there is a lush red crest, which the bird can fold and unfold in a fan shape. The wings and tail are colored in contrasting black and white stripes. The wings are wide, the flight is light, with uneven flapping, the flying hoopoe looks like a large butterfly. The beak is long, tweezer-shaped. The male and female are not significantly different, but the female is slightly smaller and usually has a lighter throat and a browner chest. In autumn the color is the same. Juveniles generally look like adults, but duller, without the wine-pink tint on the chest, white stripes on the wings with a more pronounced rufous tinge, black without shine, the beak is short and straighter. Weight 45-85 g, length 28-32, wing 14.2-15.3, span 42-49 cm. *Candidate of Biology Sciences L. Semago. Hoopoe // Science and life : magazine. - 1982. - No. 7.*	Not detected		

			- P. 159-160.			
Teratoscincus	Teri geckodars	Skink geckos	Medium sized lizards. The head is wide and high. The body is covered with uniform scales, rounded at the rear ends, superimposed on each other, similar to the scales of skinks. The head has smaller polygonal scales. Large, protruding eyes. Femoral and preanal pores are absent. They feed on insects and other invertebrates. *Ananyeva N. B. , Orlov N. L. , Khalikov R. G. , Darevsky I. S. , Ryabov S. A. , Barabanov A. V. Atlas of reptiles of Northern Eurasia (taxonomic diversity, geographic distribution and conservation status). - St. Petersburg: Zoological Institute of the Russian Academy of Sciences, 2004. - P. 43. - 1000 copies. — ISBN 5-98092-007-2*	Not detected		
East Kazakhstan region						
Buteo japonicus	Shygys tilemish	Eastern buzzard	Previously considered a group of subspecies of the common buzzard (Buteo buteo). It differs from the geographically close steppe buzzard (Buteo buteo vulpinus) in the less developed bright rufous tones. Adult eastern buzzards are dark brown or grayish-brown on the dorsal side with buffy-reddish or whitish feather edges; grayish-brown striated tail; ventral side with whitish or buffy throat and chest, sometimes more or less mottled with longitudinal brown stripes; the belly and sides are rusty-brown with a whitish transverse pattern, the plumage of the lower leg is brown with narrow ocher transverse stripes. Juveniles in the first annual (breeding) plumage are less reddish, have buffy edges on the feathers of the dorsal side, and the ventral side without a transverse pattern. There is also a monochromatic brown variation. The tarsus is usually slightly more than half feathered. Larger than vulpinus. The wing length of males is 365-388, females 378-426, on average 377.9 and 399.2 mm,	02.08.23 Discovered		

			respectively. The length of males is 507-532, females 530-574, on average 521.9 and 548.7 mm. The wingspan of males is 1104-1220, females 1200-1315. *Eastern buzzard (Buteo japonicus). Birds of Kazakhstan*			
Merops apiaster	Saryalkym arazhegish	European bee-eater	The size of a starling. The top of the head and the front of the back are chestnut, the back of the back and the lower back are golden-red. The tail coverts are bluish-green, the tail coverts are greenish-blue with dark tips. The frenulum, the stripe running across the eye, and the ear coverts are black. The chin and throat are bright yellow. The sides of the head are greenish-blue, the ventral side is greenish-blue. The beak is black. The central pair of tailbones are elongated and pointed. The male and female are the same size and very similar in color, the male is slightly larger. In the female, a green coating is more noticeable on the brown areas of the plumage in the front of the cap, on the back and wings. Autumn color is similar to the nuptial color and appears already in August, after leaving the nesting sites. Juveniles are noticeably different from adults in the uniform, almost entirely grayish-green color of the upper body and wings, the chest and abdomen are bluish-greenish, the central pair of tail feathers only slightly protrudes beyond the edge of the tail. Weight 45-80 g, length 23-30, wing 14.0-15.9, span 40-49 cm. *Boehme R. L. , Flint V. E. Five-language dictionary of animal names. Birds. Latin, Russian, English, German, French / Under general. ed. acad. V. E. Sokolova . - M.: Russian language , RUSSO, 1994. - P. 180. - 2030 copies. — ISBN 5-200-00643-0*	Not detected		

Phrynocephalus versicolor	Shubar batbat kesirtke	Variegated roundhead	The range of the motley roundhead is located within Mongolia, in western China, and in Russian Tuva, in its southern part. There are unconfirmed reports of roundhead finds in Buryatia. Roundheads living in the east of Kazakhstan in the Zaisan and Alakol basins now belong to the Ph species. melanurus, and the form from the upper reaches of the Ili (former Ph. v. paraskiwi) - to the species Ph. alpherakii from the variegated roundhead complex ("Ph. guttatus"), that is, the attribution of this form to the variegated roundhead was erroneous. Common in Mongolia and China. *Ananyeva N. B. , Orlov N. L. , Khalikov R. G. , Darevsky I. S. , Ryabov S. A. , Barabanov A. V. Atlas of reptiles of Northern Eurasia (taxonomic diversity, geographic distribution and conservation status). - St. Petersburg: Zoological Institute of the Russian Academy of Sciences, 2004. - P. 64. - 1000 copies. — ISBN 5-98092-007-2*	Not detected		

Abay region						
Phrynocephalus helioscopus	Takyr dongelek bass	Takyr round head	The total length reaches 7 cm. The tail is relatively short, its length does not exceed the length of the body. Females are slightly larger than males. It has a characteristic profile of the muzzle, the upper surface of which passes almost vertically to the lip, so that the nostrils are not visible when viewed from above. The body is short, flattened, the upper side of the body is covered with heterogeneous scales. The dorsal scales are slightly larger than the lateral ones, sometimes with weakly defined ribs; individual scales or groups of them on the back, sides and at the base of the tail are slightly enlarged from above and bear short spines. On the sides of the body they are located in 3-4 longitudinal rows on top of small tubercles. *N.B. Ananyeva, N.L. Orlov, R.G. Khalikov, I.S. Darevsky, S.A. Ryabov, A.V. Barabanov "Atlas of reptiles of Northern Eurasia (taxonomic diversity, geographic distribution and conservation status)" Zoological Institute of the Russian Academy of Sciences, St. Petersburg, p. 59*	Not detected		

Pelecanus onocrotalus	Kyzgylt pelican	Pink Pelican	Old birds are white, with a strong pink bloom and a yellow spot on the chest; the primary flight feathers and their coverts are black-brown, the secondary flight feathers are gray; on the back of the head there is a bunch of narrow pointed feathers. The beak is red with a bluish-gray stripe in the middle and a whitish marigold; the throat sac is yellow with red veins, the legs are pink with yellow membranes. It differs from the Dalmatian pelican in its pinkish (not light gray) color and black secondaries. In young birds, the head and neck are light brown, the crop is dirty white, the upper side is brownish-gray, the lower side is brownish, the wings and tail are brown. Dimensions: wing 640-770 mm, tail 140-210 mm, metatarsus 130-150 mm, beak 300-450 mm. The female is slightly smaller than the male. Weight: up to 11 kg. *Boehme R. L. , Flint V. E. Five-language dictionary of animal names. Birds. Latin, Russian, English, German, French*	Not detected		

Pavlodar region						
Charadrius dubius	Shaushurildek	Little plover	A small sandpiper, slightly larger than a sparrow, with the dense build of a plovers and a contrasting black and white pattern on the head and chest. It differs from the ringed one in its smaller size, a completely black beak (there may be a yellow base of the mandible), a yellow leathery rim around the eye, a black frontal stripe edged at the back by a narrow white stripe. The white longitudinal stripe on the wing is weak and invisible from a distance. The legs are three-toed, buffy-pinkish or dull yellow.. They are best distinguished from young ringed birds in flight by the absence of a clear white stripe on the wing. In manners, like other plovers, fast runs with sharp stops and bows are very characteristic. Weight 30-50 g, length 14-15, wing 10.9-12.3, span 42-48 cm. *Boehme R. L. , Flint V. E. Five-language dictionary of animal names. Birds. Latin, Russian, English, German, French*	Not detected		

Eremias scripta	Zholakty kesirtke	Striped foot and mouth disease	A very small lizard, body length does not exceed 5 cm. The premaxillary shield does not touch the lower nasal shield. In the anterior part of the frontal shield there is a clearly visible longitudinal groove. The infraorbital shield touches the edge of the mouth. The upper scales of the tail are small, slightly ribbed. The rows of femoral pores do not reach the knee bend. The top is sandy grey. Along the back there are 5 or 7 narrow stripes of brown color, moving to the tail and merging in pairs. On the sides there are wider stripes of the same color. The top of the head is covered with small, sinuous dark spots. The bottom is white. *Bannikov A. G., Darevsky I. S., Rustamov A. K. Amphibians and reptiles of the USSR / ed. prof. A. G. Bannikova. - M.: Mysl , 1971. - P. 159-161. — 303 p.*	Not detected		
North-Kazakhstan region						
Lepus timidus	Ak koyan	White hare	Large hare: body length of adult animals is from 44 to 65 cm, occasionally reaching 74 cm; body weight 1.6-4.5 kg[2]. Average sizes decrease from northwest to southeast. The largest white hare lives in the tundra of Western Siberia (up to 5.5 kg), the smallest in Yakutia and the Far East (3 kg). The ears are long (7.5-10 cm), but noticeably shorter than those of the hare. The tail is usually solid white, relatively short and rounded, 5–10.8 cm long. *Sokolov V. E. Five-language dictionary of animal names. Latin, Russian, English, German, French. 5391 titles Mammals. - M.: Russian language, 1984. - P. 205. - 10,000 copies. — ISBN 5-200-00232-X.*	Not detected		

Capreolus	Elik	Roe deer	Small deer with a slender build and long neck. The legs are thin and long. The head is small in size with long and wide ears. Only males have small, double-branched horns, round in cross-section. Usually the horn ends in three branches at the apex. The surface of the horn from the base is covered with many protrusions and tubercles. The color is dark red in summer, gray-brown in winter, there is a white spot in the tail area; the tail is very small. *Timofeeva E. K. Roe deer . - L.: Publishing house Leningr. University, 1985. - 224 p. — (Life of our birds and animals. Issue 8). — 25,000 copies.*	Not detected		
Kostanay region						
Anthus campestris	Tuz zhadyragy	Field Pipit	Smaller in size than the steppe pipit. Hind claw less than 12 mm long. The general color of the dorsal side is yellowish-sandy-brown with dark streaks. The back of the back, loin and rump are without streaks. The ventral side is buffy-whitish with a brownish tint on the chest and sides. There are vague brownish streaks on the crop and on its sides. The eyebrow is light. The outer two pairs of tail feathers are buffy-white with brown wedges. Young birds have a dorsal side with a scaly pattern, and the abdominal side with abundant development of streaks on the sides of the throat, on the chest and on the sides of the body. *Boehme R. L. , Flint V. E. Five-language dictionary of animal names. Birds. Latin, Russian, English, German, French / Under general. ed. acad. V. E. Sokolova . - M.: Russian language , RUSSO, 1994. - P. 274. - 2030 copies. — ISBN 5-200-00643-0 .*	08/07/23 Discovered		

Spermophilus	Saryshunaktar	Gophers	Body length 14-40 cm, tail 4-25 cm (usually less than half the body length). Gophers use their tail in the following cases: in the steppe, in order not to overheat, the tail serves as an umbrella for the gopher, in winter, when the gopher is sleeping, it serves as a blanket, and when the gopher walks in a hole, it touches the walls with it and understands where to go. The hind limbs are slightly longer than the forelimbs. The ears are short, slightly pubescent. The color of the back is very diverse - from green to purple. Often there are dark ripples, longitudinal dark stripes, light streaks or small spots on the back. There may be light stripes along the sides of the body. The belly is usually dirty yellow or whitish in color. *Complete illustrated encyclopedia. "Mammals" Book. 2 = The New Encyclopedia of Mammals / ed. D. MacDonald. - M.: Omega, 2007. - P. 441-442. — 3000 copies. — ISBN 978-5-465-01346-8 .*	08/07/23 Discovered		
Lynx,	Sileusin	Lynx	The lynx is a typical cat, although the size of a large dog, which it partly resembles with its shortened body and long legs. The head of a lynx is very characteristic: relatively small, rounded and very expressive. The height of an ordinary lynx reaches 55 cm, a Canadian lynx from 48 cm to 56 cm, and a Pyrenean lynx from 60 to 70 cm. They differ from other cat lynxes by their short tail and tufts at the ends of their ears. The body weight of a lynx is from 10 to 20 kg. *Breitenmoser, U., Mallon, D.P., von Arx, M. & Breitenmoser-Wursten, C. (2008)*	Not detected		

Akmola region						
Sus scrofa	Kaban	Boar	The wild boar is an omnivorous artiodactyl, non-ruminant mammal of the genus Sus. Differs from the domestic pig, which undoubtedly descended from the wild boar (and other related species), has a shorter and denser body, thicker and higher legs; in addition, the boar's head is longer and thinner, its ears are longer, sharper and, moreover, erect. The constantly growing upper and lower fangs, protruding upward from the mouth, are much more developed in the male than in the female. *Boar, wild pig // Encyclopedic Dictionary of Brockhaus and Efron : in 86 volumes (82 volumes and 4 additional). - St. Petersburg, 1890-1907*	Not detected		
Cervidae	Bugylar	Deer	The size of deer varies between the size of a hare (pudu) and a horse (elk). Characterized by branched horns, which are present only in males. The only exceptions are the water deer, which has no antlers at all, and the reindeer, in which both sexes bear antlers. The antlers are shed every year and grow back. In reindeer, males shed their antlers in November-December, and females in May-June after calving, which helps female reindeer in winter to protect moss dug out in the snow from stronger but antlerless males. *Sokolov V. E. Systematics of mammals. T. 3. (cetaceans, carnivores, pinnipeds, aardvarks, proboscideans, hyraxes, sirens, artiodactyls, calloseds, odd-toed ungulates) - M.: Higher School, 1979. - 528 p.*	Not detected		

Chlidonias leucopterus	Akanat karkyldak	White-winged Tern	In spring, the body is black, the wings are light gray on top, and white along the leading edge from the base to the fold, and this is the main difference from the black tern; From below, another difference is visible in flying birds - the contrasting two-color coloring of the wing. The tail and rump are white. The beak is reddish-black, the legs are bright red. Tail with a shallow notch. In autumn, adult birds are mostly white, with a gray coating on the wings, body, a black spot behind the eye and dark gray, with light streaks, on the back of the head. There are no dark spots on the sides of the chest, unlike the black tern. Juveniles have generally the same head coloration, but the back is very dark and the wings are quite dark, unlike young black terns - a very light, almost white tail, sharply contrasting with the dark back, the absence of dark spots on the sides of the chest. Weight 53-80 g, length 20-23, wing 20.0-22.4, span 63-67 cm. *Delina, Hakan, Svensson, Lars. Der Kosmos-Vogelatlas, übersetzt von Peter H. Barthel, ISBN 3-7632-4277-5 .*	. Not detected		

Karaganda region						
Gazella subgutturosa	Karakuyryk	Jeyran	Body length 93-116 cm, height at the withers - 60-75 cm, weighs 18-33 kg. Males have black lyre-shaped horns, about 30 cm long, with transverse rings. Females are hornless; occasionally have rudimentary horns[2] up to 3-5 cm long. The color of the upper body and sides is sandy. The underparts, neck and inside of the legs are white. The white “mirror”, that is, the spot at the back, is small in size. Tail with black tip. When the gazelle runs, it raises its tail vertically and its black end stands out sharply against the background of the white “mirror”, for which the gazelle received the nickname “black tail” (“kara-kuyryuk” among the Kazakhs, “hara-sulte” among the Mongols). Winter fur is lighter than summer fur. *Jeyran // Biology. Big encyclopedic dictionary / Ch. ed. Gilyarov M.S.. - 3rd (reprint). - M.: Great Russian Encyclopedia, 1998. - P. 175. - 864 p. — 100,000 copies. — ISBN 5-85270-252-8.*	Not detected		

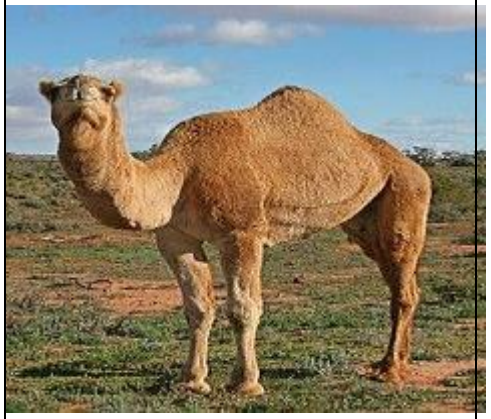
Беркут	Burkit	Golden eagle	The largest of the eagles. The bottom is completely dark. There are significant individual variations in the color of the upperparts in combinations of dark brown, gray and ocher-red. The tail in adults is brownish-gray above and below at the base, with a marbled pattern, often forming dark transverse stripes, gradually darkening towards the end to dark brown.; There are a lot of white feathers scattered on the bottom of the body, more on the lower belly and on the undertail. With subsequent molts, up to 6 years of age, the white color on the body, tail and wings becomes less and less. Weight of males 2.8-4.6, females - 3.8-6.7 kg, length 76-93, wing of males 56.5-68.0, females - 63.7-74.1, wingspan 180-240 cm. *V. Beycek, K. Stastny. Birds. Illustrated Encyclopedia . - M.: Labyrinth-press, 2004. - P. 97 . — ISBN 5-9287-0615-4 .*	Not detected		

Ulytau region						
Vulpes corsac	Karsak	Korsak	The corsac is similar to an ordinary fox, but noticeably smaller (body length 50-60 cm, tail 25-35 cm), with larger ears and long limbs. Height at the withers is about 30 cm. Weight is 4-6 kg. The muzzle is short, strongly pointed; wide cheekbones; The ears are large, wide at the base, pointed towards the ends. The usual color is light, gray or reddish-gray, there are shades of red; the belly is whitish or yellowish, the tip of the tail is dark brown or black, the chin is light. Seasonal morphism in the length of the fur is expressed: in winter the fur is long and lush, in summer it is short and close-fitting. In winter, a gray coating is noticeable near the ridge of the corsac. The corsac differs from the common fox by the dark end of its tail, and from the Afghan fox by its shorter tail and white coloration of the chin and lower lip. *Geptner V. G. Korsak*	The area has not been explored		

Mustela nivalis	Akkalak	Weasel	Weasel is the smallest representative of the order of carnivores. Body weight of males is 60-250 g, females 53-120 g, body length of males is 160-260 mm, females 114-212 mm, tail length in males is 12-87 mm, in females 17-64 mm. It moves in jumps 25-30 cm long. The structure of the long, flexible body and the color of the fur are very similar to the ermine, but differ in its small size and shorter, and most importantly, monochromatic tail; She does not have a black tassel on her tail. The body of the weasel, like that of the ermine, is thin and long, with short legs armed with very sharp claws. The head is oblong with small rounded ears, the nose is blunt and slightly forked at the end. *Weasel // Encyclopedic Dictionary of Brockhaus and Efron : in 86 volumes (82 volumes and 4 additional). - St. Petersburg, 1890-1907.*.	The area has not been explored		

Picoides tridactylus	Ushsausakty tokyldak	three-toed woodpecker	An adult male three-toed woodpecker has a golden-yellow crown. The back is black or black-brown. From the back of the neck, along the back, there is a wide white stripe, sometimes with dark markings. The rump is black. The three central pairs of tail feathers are black, the two outer pairs are white, with black stripes. The flight feathers are black-brown, with small streaks on the outer webs and larger streaks on the inner webs in their main half. There are white spots on the tips of the primaries. The underwings are motley, black and white. The sides of the head are black; A white stripe runs from the eyes back, merging with the white of the upper part of the neck. Black “whiskers” extend from the base of the beak. The throat, crop, and belly are white, the sides with black transverse streaks, which thicken at the undertail. Sizes of adults from Kazakhstan: males wing 121 - 129; females wing 118-128 mm. Weight of adult males: 52 - 71 g; females: 57.5 - 75 g. *Estafyev A. A., Mineev Yu. N., Kochanov S. K., Anufriev V. M., Demetriades K. K., Neufeld E. D. Volume I, part 2. Birds. Non-passerines // Fauna of the European north-east of Russia. - St. Petersburg: Nauka, 1999. - 290 p. — ISBN 5-02-025945-4 .*	The area has not been explored		

Mangistau region						
Larus marinus	Teniz Shagalasy	sea gull	The sea gull can reach a length of 75 cm and is the largest species of gull. It weighs up to 2 kg, and its wingspan is about 170 cm. Its plumage is white except for the upper side of the wings, which is black. A powerful yellow beak has a red spot on the tip on the underside. The color of the paws is pale pink. The plumage of chicks is brown and becomes white, like that of adults, only after four years. In flight, the sea gull can reach speeds of up to 110 km/h. She has no natural enemies. Life expectancy is up to 23 years. *Boehme R. L. , Flint V. E. Five-language dictionary of animal names. Birds. Latin, Russian, English, German, French / Under general. ed. acad. V. E. Sokolova . - M.: Russian language , RUSSO, 1994. - P. 90. - 2030 copies. — ISBN 5-200-00643-0 .*	The area has not been explored		

Columba rupestris	Kuz kepteri	rock pigeon	The rock pigeon is very similar to the rock pigeon, from which it is well distinguished by the presence of a wide white stripe on the tail. The general coloration of adult rock pigeons is gray, darker on the head and neck. Around the neck, on the crop and the front of the chest there is plumage with a green and purple metallic sheen. The back of the back is white. The rump is lead-gray. There are two black stripes across the wing (not always solid). The tail tails are dark gray, a wide white apical stripe runs across the entire tail, the tail tips are dark; outer pair of tail feathers with white outer fan. The beak is black, the legs are red, the iris is orange or red. Juveniles are colored similar to adults, but without a metallic tint in the plumage; all colors are duller, some with a brownish tint. Dimensions: wing 210-245 mm, tail 115-135 mm, metatarsus 23-29 mm, beak 12-188 mm. Weight: about 280 g. *Birds of Russia and adjacent regions: Fritillary, Pigeonid, Cuckoo-shaped, Owl-shaped / Res. ed. V. D. Ilyichev and V. E. Flint. - M.: Nauka, 1993. - P. 98-110. — 400 s. ISBN 5-02-005507-7*	The area has not been explored		
Camelus	Thuye	Camels	The weight of an adult camel is 500-800 kg, the height at the withers is up to 210 cm. The one-humped camel is reddish-gray in color, while the two-humped camel is dark brown. Curly fur └. Camels can live up to 40 years, reproductive age begins at 2-3 years. Pregnancy lasts 13 months for one-humped camels and 14 months for two-humped camels. Camels have a long, arched neck and small and rounded ears. Camels have 38 teeth. Below - ten incisors, two canines, 10 molars, above - *2 incisors, 2 canines, 12 molars* *Mammals. Large encyclopedic dictionary / scientific. ed. d.b. n. I. Ya. Pavlinov . - M.: ACT, 1999. - P. 40. - 416 p. — ISBN 5-237-03132-3 .*	The area has not been explored		

Atyrau region						
Dipodidae	Kosayaktar	jerboas	The appearance of jerboas is very characteristic due to their short, stubby body and elongated, strong hind limbs, the length of which is sometimes 4 times the length of the forelimbs. When moving slowly, some jerboas move on all four legs, but most species move only on their hind legs. When moving quickly, jerboas switch to ricocheting jumps up to 3 m long (large jerboa). The hind limbs of jerboas are greatly modified: the foot is elongated, and the 3 middle metatarsal bones are fused into one bone, called the tarsus (the exception is half-jerboas - five-toed and three-toed). The lateral toes on the hind legs are shortened or completely absent. In general, the hind limbs of Asian species are 5-toed, while those of African species are 3-toed. *Jerboas // Encyclopedic Dictionary of Brockhaus and Efron : in 86 tons (82 tons and 4 additional). - St. Petersburg, 1890-1907 .*	The area has not been explored		

Tachybaptus ruficollis	Kishkene suksyr	Little grebe	The little grebe is a very small bird, slightly larger than a thrush. In breeding plumage, the upperparts are black-brown, the flight feathers are brown, while the secondaries have significant white spots; the bridle and throat are black, the front and sides of the top of the neck are chestnut-red; the underside is grayish-brown, the middle of the belly is somewhat lighter; the axillary and underwing coverts are white. In winter the upper side is brown; the sides of the head and neck and the front of the neck are dirty buffy; the throat, lower chest and belly are almost white, with a slight brown coating. The young are colored similar to the winter plumage of the adults, but in general are paler, the underside of the neck is almost without buff, and the underside is even whiter, almost without brown. At mating time, it is well recognized by the absence of a collar and crests, and by the red coloring of the cheeks and neck. In autumn it differs from other small grebes in its predominantly ocher-red color. Weight 110-370 g, length 25-29, wing 9.0-11.1, span approx. 40 cm. *Boehme R., Dinets V., Flint V., Cherenkov A. Birds (Encyclopedia of Russian Nature). - Moscow: ABF, 1996. - 430 p.*	The area has not been explored		

West-Kazakhstan region						
Castor	Kundyzdar	Beavers	a genus of mammals from the order of rodents. The only modern representative of the beaver family (Castoridae Hemprich, 1820). It is divided into two species - the common beaver (Castor fiber), which lives in the area from the Atlantic coast to the Baikal region and Mongolia, and the Canadian beaver (Castor canadensis) - in North America. Some zoologists consider the Canadian beaver as a subspecies of the common beaver, but this point of view is contradicted by the different number of chromosomes (48 in the common beaver and 40 in the Canadian). Modern taxonomy distinguishes eight subspecies of the common beaver *Davletov I.Z. Ecology of beaver in an urban landscape. - Kirov, 2005. - 116 p.*	The area has not been explored		
Anas penelope	Saryaidar ұyrek	Wigeon	The young in the field are practically indistinguishable from the female. Males in the first spring (2nd calendar year, i.e., almost one-year-olds) most often have the same coloration as old males, but there is no white field on the wing (it appears by the spring of the 3rd calendar year in the form of a narrow white stripe) , the back is more or less brown, gray or blackish, without a streaky pattern; There are one-year-old males with almost female coloration. The legs are gray, may have a bluish, brown or yellow tint and with darker membranes, the beak is light gray-blue, with a black tip, always shorter than 38 mm. Weight of males 600-1100 g, females - 500-1000 g, length 45-51, wing of males 24.6-28.1, females - 22.8-26.2, wingspan 75-86 cm. *Buturlin S. A., Dementyev G. P. Complete guide to birds of the USSR.*	The area has not been explored		

Strix aluco	Karapayim uki	Great owl	In young birds, fragments of the chick's plumage remain until autumn. Then, in the first adult outfit, they are no different from adults from a distance; contact characteristics: until spring, in young birds the tail feathers are pointed (in adults - rounded), all flight feathers are of the same age and approximately equally worn (in adults, due to gradual molting, along with the old worn ones, there are new feathers). Weight 400-700 g, length 41-46, wing of males 26.8-29.5, females - 26.9-31.1, wingspan 90-105 cm. *Boehme R. L. , Flint V. E. Five-language dictionary of animal names. Birds. Latin, Russian, English, German, French*	The area has not been explored		
Trapelus sanguinolentus	Dala Agamas	Steppe agama	The total length of the steppe agama does not exceed 30 cm, with the length of the body including the head up to 12 cm, the tail is 1.3-2 times longer than the body. Body weight up to 45 g (according to other sources up to 62 g). In the Ciscaucasia, agamas are smaller compared to Central Asian ones: their body length is up to 8.5 cm, weight up to 27 g. Adult males are noticeably longer than females and have a preanal callus. The upper head scutes are slightly convex and unribbed. The occipital scute, on which the parietal eye is located, is the same size as the surrounding scutes. The nostrils are located at the back of the nasal shields and are almost invisible from above. There are 15-19 upper labial scutes. *Bannikov A. G., Darevsky I. S., Ishchenko V. G., Rustamov A. K., Shcherbak N. N. Key to amphibians and reptiles of the fauna of the USSR. - M.: Education, 1977. - P. 105-108. — 415 p.*	The area has not been explored		
*Note: + - species detected; 0 – species not found						

Table H.4 – Taxonomic composition of the diversity of aquatic invertebrates and fish

Latin (scientific name)	Name in state language	Title in Russian	Known for a given territory (indicating source of information)	Discovered (indicating the timing of the research)	Quantity	Note
1	2	3	4	5	6	
Aktobe region						
Cyprinus carpio	Carp	Carp	A large omnivorous fish with a thick, moderately elongated body, covered with large, smooth, tightly fitting scales. The sides are golden in color, the back is darkish. The color may vary depending on the habitat. At the base of each scale there is a dark spot; the edge of the scales is bordered by a black dotted stripe. There are 32-41 scales in the lateral line. Although rare, specimens weighing over 40 kg and more than a meter long are found. The head is large. The mouth is semi-lower, retractable. The lips are well developed. The upper lip has two pairs of well-developed short whiskers. *The dorsal fin is long with a small notch, the anal fin is short. The dorsal and anal fins each have a jagged, spiny ray ("file"). Carp, fish of the carp family // Encyclopedic Dictionary of Brockhaus and Efron : in 86 volumes (82 volumes and 4 additional). - St. Petersburg, 1890-1907 .*	08.08.23 Discovered		

Perca fluviatilis	Ozen alabugasy	River perch	The body of the perch is greenish-yellow in color with black transverse stripes on the sides, of which there can be from 5 to 9; The belly of the perch is white. Perch have two dorsal fins located very close to each other, with the first dorsal fin higher and longer than the second. The first dorsal fin begins above or slightly in front of the base of the pectoral fins. At the end of the first dorsal fin there is a black spot, which is a distinctive feature of the species. The pectoral fins are slightly shorter than the pelvic fins. The first dorsal fin is gray, the second dorsal is greenish-yellow, the anal and pectoral fins are yellow, sometimes red, the pelvic fins are light with a bright red border. Baranov V. Yu. Analysis of patterns of phenotypic variability in natural and anthropogenic conditions using the example of Ural populations of bream and river perch. — Dissertation for the degree of candidate of biological sciences. - Ekaterinburg, 2007. - 225 p.	08.08.23 Discovered		
Kyzylorda Region						
Acipenser ruthenus	Suirik	Sterlet	Among other sturgeons, it is distinguished by the earliest onset of sexual maturity : males spawn for the first time at the age of 4-5 years, females - 7-8 years. Fertility 4 thousand - 140 thousand [caviar _ Spawns in May, usually in the upper reaches of rivers. The eggs are sticky and are deposited on rocky and pebble soil. It develops in about 4-5 days. Adults usually reach a length of 40–60 cm and a weight of 0.5–2 kg; sometimes specimens weighing 6–7 kg and even up to 16 kg are found. *Chebanov M. S., Galich E. V. Guidelines for artificial reproduction of sturgeon fish . - Ankara: FAO, 2013. - 325 p.*	Not discovered		

Esox lucius	Shortan	Pike	Length up to 1.5 meters, weight up to 35 kilograms (usually up to 1 meter and 8 kilograms). The body is torpedo-shaped, the head is large, the mouth is wide. The color is variable, depending on the environment: depending on the nature and degree of development of the vegetation, it can be gray-greenish, gray-yellowish, gray-brown, the back is darker, the sides have large brown or olive spots that form transverse stripes. Unpaired fins are yellowish-gray, brown with dark spots; paired ones - orange. It feeds mainly on fish. Silver pike are found in some lakes. *Reshetnikov Yu. S. , Kotlyar A. N., Rass T. S. , Shatunovsky M. I. Five-language dictionary of animal names. Fish. under general ed. acad. V. E. Sokolova . - M.: Rus. language , 1989. - 733 p. — 12,500 copies. — ISBN 5-200-00237-0 .*	07/29/23 Discovered		
Leuciscus idus	Ak kairan	Ide	Adult ide usually reach a length of 35-53 cm and a weight of 2 to 2.8 kg, although some individuals can be up to 90 cm long and weigh up to 6-8 kg. Lives from 15 to 20 years. The body is thick. The head is shortened, the mouth is small and oblique. Depending on the area, age or time of year, ide may show more or less obvious differences. The back is bluish-black, the sides of the body are whitish, the belly is silvery, the caudal and dorsal fins are dark, the lower and lateral fins are red. *Brem A. Animal life / Ed. Professor Nikolsky A. M. - M.: OLMA-Press; Red Proletarian, 2004. - P. 882. - 1192 p. — ISBN 5-05197-214-9 .*	Not detected		

Turkestan region						
Ctenopharyngodon idella	Ak cupid	White amur	The body is elongated, cylindrical, almost not compressed laterally, covered with large scales. The head is wide with a terminal mouth. The snout is very short, its length is equal to or less than the diameter of the eye. The mouth is small, the posterior edge of the upper jaw reaches the vertical line passing through the beginning of the orbit of the eye. There is no chin barbel. The gill cover has radial stripes. There are 12 gill rakers on the first gill arch. The pharyngeal teeth located on the last gill arch are double-rowed. The dental formula is 2.5-5.2 (sometimes 2.4-4.2), that is, on the left side of the arch there are 2 teeth in one row, and 5 teeth in the second; on the right side there are 5 teeth in one row and 2 in the other. *Shireman, J. V. and C. R. Smith. Synopsis of biological data on the grass carp, Ctenopharyngodon idella (Cuvier and Valentines, 1844) . — Food and Aquaculture Organization Synopsis. - 1983. - 86 p.*	Not detected		
Channa argus	Zhylanbas balyk	Snakehead	The body is elongated, cylindrical in the middle part, laterally compressed in the tail part. The head is large, flattened in the dorsoventral direction, and is shaped like the head of a snake. The head and body are covered with cycloid scales. The eyes are shifted towards the end of the snout. The mouth is large, terminal, the posterior edge of the upper jaw extends beyond the edge of the eye. The long dorsal fin has 50-53 soft rays. The anal fin has 33-38 soft rays. The caudal fin is rounded. The body is brown, covered with dark brown spots of irregular shape. Two dark stripes run from the eye to the edge of the gill cover. *Snakehead // Great Soviet Encyclopedia : [in 30 volumes] / ch. ed. A. M. Prokhorov . — 3rd ed. - M.: Soviet Encyclopedia, 1969-1978.*	Not detected		

Jambyl Region						
Sander lucioperca	Kokserke	Zander	Large size fish. According to official data, there are individuals more than a meter long and weighing up to 10-15 kg; there are probably larger specimens. There are 80-97 scales in the lateral line. The back and top of the head are greenish-gray, the belly is white. There are 8-12 short wide transverse stripes of brown-black color on the sides. The paired and anal fins are gray-yellow; on the dorsal and caudal fins there are rows of dark spots located on the membranes between the rays. A characteristic feature is the presence of large fang-shaped teeth on the jaws, which are usually larger in males than in females. *Life of animals. Volume 4. Lancelets. Cyclostomes. Cartilaginous fish. Bony fish. / edited by T. S. Russ. - Moscow: Education, 1983. - P. 375. - 575 p.*	07/31/23 Discovered		
Hypophthalmichthys	Donmanday	Silver carps	The foreheads of silver carps are much wider than those of other cyprinids (hence the name). Their eyes are located in the lower part of the head, so the forehead looks even larger. The body length of silver carp is up to 1 meter (sometimes more), and the average weight is 20-35 kg, although there are specimens whose weight exceeds 50 kg. Some species have a keel on the belly, starting at the throat. Also, a number of species are characterized by a special device for filtering plankton. *Life of animals. Volume 4. Lancelets. Cyclostomes. Cartilaginous fish. Bony fish. / edited by T. S. Russ. - Moscow: Education, 1983. - P. 375. - 575 p.*	Not detected		

East Kazakhstan region						
Clupeonella engrauliformis	Anchoustectes tylkas	Anchovy sprat	The maximum body length is 16.5 cm, weight is up to 26 g. The body is elongated, low, its height is 16-19% of the body length. The scales fall off easily. The head is short and wide, the interorbital distance is 16-18% of the body length, the mouth is small. The belly is rounded with a keel, in which there are 23-31 keel scales. There are 56-67 gill rakers. The dorsal fin has 13-21 soft rays, the first three rays being unbranched. The anal fin has 18-22 soft rays, the first three unbranched. The almost black caudal fin is strongly notched. The edges of the pectoral fins are pointed. *Reshetnikov Yu. S. , Kotlyar A. N., Rass T. S. , Shatunovsky M. I. Five-language dictionary of animal names. Fish. Latin, Russian, English, German, French. / under general ed. acad. V. E. Sokolova . - M.: Rus. language , 1989. - P. 59. - 12,500 copies. — ISBN 5-200-00237-0 .*	Not detected		
Kostanay region						
Lota lota	Nalim	Burbot	The body is elongated, low, rounded in the anterior part and strongly laterally compressed in the posterior part. The head is flattened, its length exceeds the maximum height of the body. The eye is small. The mouth is large, semi-lower, the lower jaw is shorter than the upper. There are small bristle-like teeth on the jaws and head of the vomer, but there are none on the palate. There is one unpaired barbel on the chin (constituting 20-30% of the length of the head) and a pair of barbels on the upper jaw. *Nelson D.S. Fishes of the world fauna / Transl. 4th rev. English ed. N. G. Bogutskaya, scientific. editors A. M. Nasek, A. S. Gerd. - M.: Book house "Librocom", 2009. - P. 347-349. — ISBN 978-5-397-00675-0 .*	Not detected		

Leuciscus idus	Ak kairan	Ide	Adult ide usually reach a length of 35-53 cm and a weight of 2 to 2.8 kg, although some individuals can be up to 90 cm long and weigh up to 6-8 kg. Lives from 15 to 20 years. The body is thick. The head is shortened, the mouth is small and oblique[3]. Depending on the area, age or time of year, ide may show more or less obvious differences. In spring, the body of ide has a metallic sheen: the gill covers, that is, “cheeks,” and the head seem to be golden; when turning towards the sun, the colors quickly change and the fish acquire golden, silver, or almost dark tones; the lower fins, and sometimes the upper and caudal fins are reddish. The back is bluish-black, the sides of the body are whitish, the belly is silvery, the caudal and dorsal fins are dark, the lower and lateral fins are red. *Knipovich N. M. Ide // Encyclopedic Dictionary of Brockhaus and Efron : in 86 volumes (82 volumes and 4 additional). - St. Petersburg, 1890-1907 Eyes greenish-yellow or yellow with a dark spot at the top*	Not detected		
Tinca tinca	Ongak	Tench	The short, tall and thick body of the tench is covered with small, tightly fitting scales and a thick layer of mucus. There are 90-120 scales in the lateral line. The color of the body depends on the living conditions: from greenish-silver (in clear water with sandy soil) to dark brown with a bronze tint (in reservoirs with silty soil). The dorsal and anal fins are relatively short. The dorsal fin has 4 unbranched and 8-9 branched rays, the anal fin has 3 unbranched and 8-9 branched rays. *Nelson D.S. Fishes of the world fauna / Transl. 4th rev. English ed. N. G. Bogutskaya, scientific. editors A. M. Nasek, A. S. Gerd. - M.: Book house "Librocom", 2009. - P. 347-349. — ISBN 978-5-397-00675-0 .*	Not detected		
*Note: + - species detected; 0 – species not found						

Appendix B

Phenological site passport [31]

Phenological area of the site ____ For grass cover - 5x5 m, for shrubs - 10x10 m, trees 20x20 m. **5x5 m, 10x10 m.**

Coordinates of the phenological site according to GPS data, altitude: **45.468256, 64.066397**

Description: the site is located **in Karmakshinsky district, Kyzylorda region**

Distance from (object) **400m, size 0.2-0.5m.**

Site laying date: **07/29/23**

List of plant species: **Cousinia false-related, Pribrezhnitsa intermediate, Leafless saxaul**

Phenological area of the site ____ For grass cover - 5x5 m, for shrubs - 10x10 m, trees 20x20 m._ **5x5 m**

Coordinates of the phenological site according to GPS data, altitude: **43.271974, 74.203983**

Description: the site is located **in Kordai district, Zhambyl region**

Distance from (object) **500 m, size 0.2-0.5 m.**

Site laying date **: 07/31/23**

List of plant species: **Adonis vernacular, Snowy water lily**

Phenological area of the site__ For grass cover - 5x5 m, for shrubs - 10x10 m, trees 20x20 m. **5x5 m**

Coordinates of the phenological site according to GPS data, altitude: **49.692209, 84.337025**

Description: the site is located **in the Altai region, East Kazakhstan region**

Distance from (object) **400m, size 0.2-0.6m.**

Site laying date: **08/02/23**

List of plant species: **Kopeechnik, Mytnik milovidny.**

Phenological area of the site ____ For grass cover - 5x5 m, for shrubs - 10x10 m, trees 20x20 m. **5x5 m.**

Coordinates of the phenological site according to GPS data, altitude: **49.206511, 84.403549**

Description: the site is located **in the East Kazakhstan region, Katon-Karagay district.**

Distance from (object) **400m, size 0.2-0.5m.**

Site laying date: **08/03/23**

List of plant species: **Chin plantata.**

Phenological area of the site ____ For grassy cover - 5x5 m

Table U.1 – Indicator species of trees and shrubs

Latin name	Kazakh name	Russian name of the species
1	2	3
Aktobe region		
Crataégus	Dolan	Hawthorn
Kyzylorda Region		
Elaeágnus	Please note	Small leaf maple
Turkestan region		
Mālus	Alma Agashy	Apple tree
Jambyl Region		
Ulmus pumila	Karagash	Elm
Almaty region		
Acer rubrum	Kyzyl үyenki	Red maple
Zhetysu region		
Tilia cordata	As a matter of fact	Small-leaved linden
East Kazakhstan region		
Pinus	Karagay	Pine
Abay region		
Cedrus	Balkaragai	Cedar
Pavlodar region		
Populus tremula	Kokterek Shoktary	Aspen pegs
North-Kazakhstan region		
Betula pendula	Kotyr kayyn	Silver birch
	Kostanay region	
Pinus	Karagay	Pine
Akmola region		
Quércus róbur.	Kadimgi emen	English oak
Karaganda region		

Latin name	Kazakh name	Russian name of the species
1	2	3
Sorbus Golden Wonder	Kadimgi sheten	Mountain ash
Ulytau region		
Populus alba	Ak terek	White poplar
Mangistau region		
Populus alba	Ak terek	White poplar
Atyrau region		
Tilia	Joke	Linden
West-Kazakhstan region		
Salix	Tal	Willow

Table U.2 - Indicator species of herbaceous plants

Latin name	Kazakh name	Russian name of the species
1	2	3
Aktobe region		
Taraxacum officinale	Darilik bakbak	Dandelion officinalis
Kyzylorda Region		
Haloxylon aphyllum (Minkw.) Iljin (family Che-nopodiaceae)	Zhapyraksyz sexeuil	Leafless saxaul
Turkestan region		
Anabasis salsa	Sortands buyyrgyn nemese Biyurgun	Salt marsh barnacle, or Bi-yurgun
Jambyl Region		
Adōnis vernalis	Koktemdik zhanargul	Adonis spring, or Goritsvet
Almaty region		
Crataegus Tourn. ex L	Dolan	Hawthorn
Zhetysu region		

Ferula	Sasyr	Ferula
East Kazakhstan region		
Pedicularis venusta Schangin ex Bunge (family Scrophulariaceae)	Kandygul	Mytnik cute
Abay region		
Goniolimon eximium (Schrenk) Boiss. (family Plumbaginaceae)	Keremet Buryshtysabak	Superb blackstem
Pavlodar region		
Filipendula ulmaria	Shegirshin zhapyrakty tobylgy	Meadowsweet
North-Kazakhstan region		
Tussilágo	Kadymgi Ogeishop	Coltsfoot
Kostanay region		
Sedum	Bozkilem	Sedum
Akmola region		
Cichorium	Shashyratky	Chicory
Karaganda region		
Trifolium campestre	Dalalyk trouble	Field clover
Ulytau region		
Lobelia erinus L. (family Lobeliaceae)	Karakat Ispettegiya Lobelia	Lobelia urchin
Mangistau region		
Zinnia elegans	Symbatta Zinnia	Zinnia graceful
Atyrau region		
Anabasis cretacea Pall. (family Chenopodiaceae)	Borly Anabasis	Anabasis cretaceous
West-Kazakhstan region		
Stipa	Kauyrsyndy kop	Feather grass

Table U.3 – Phenological phases of trees and shrubs, according to observations in 2023.

View	date	Kidney swelling	Budding	Unfolding leaves	Flowering, beginning	Flowering, massive	Bloom, end	Maturation, beginning	Ripening, complete	Autumn color, beginning	Autumn color is full	Leaf fall, beginning	Leaf fall, massive	Leaf fall, end
1	2	3	4	5	5	6	7	8	9	10	11	12	13	14
Aktobe region														
Hawthorn	-	Mid May	The end of May	The end of May	The beginning of June	Mid June	End of June	End of June	**Recorded**	Beginning of September	Mid September	End of September	End of September	End of october
Kyzylorda Region														
Small leaf maple	-	End of April	Beginning of May	Mid May	The end of May	The end of May	The end of May	**Recorded**	Mid September	Mid September	Mid September	Mid September	Mid September	End of September
Turkestan region														
Apple tree	-	The end of May	The end of May	The beginning of June	The beginning of June	Mid June	Mid June	Mid June	Mid June	**Recorded**	Beginning of September	Beginning of September	Beginning of September	End of September
Jambyl Region														
Elm	-	Mid April	End of April	Beginning of May	Mid May	Mid May	The end of May	End of August	**Recorded**	End of September	End of September	Early October	Mid October	End of october
Almaty region														
Red maple	-	End of April	Beginning of May	Mid May	Mid May	The end of May	The end of May	**Recorded**	Mid September	Mid September	Mid September	Mid September	Mid September	End of September
Zhetysu region														

Small-leaved linden	-	Mid May	The end of May	The beginning of June	The beginning of June	Mid June	End of July	Mid August	**Recorded**	**Recorded**	**Recorded**	Mid September	Mid September	End of September
East Kazakhstan region														
Pine	-	End of April	Beginning of May	Mid May	Mid May	The end of May	The end of May	**Recorded**	**Recorded**	**Recorded**	**Recorded**	**Recorded**	Mid September	End of September
Abay region														
Cedar	-	End of April	Beginning of May	Mid May	Mid May	The end of May	The end of May	**Recorded**	**Recorded**	Mid September	Mid September	Mid September	Mid September	End of September
Pavlodar region														
aspen pegs	-	Early April	Mid April	End of April	Mid May	The end of May	The end of May	**Recorded**	**Recorded**	**Recorded**	Mid September	Mid September	End of September	End of September
North-Kazakhstan region														
Silver birch	-	Mid April	End of April	End of April	End of April	End of April	The end of May	**Recorded**	**Recorded**	Mid September	Mid September	Mid September	End of September	Mid October
Kostanay region														
Pine	-	Mid April	Beginning of May	Mid May	Mid May	The end of May	The end of May	**Recorded**	**Recorded**	**Recorded**	**Recorded**	**Recorded**	Mid September	Mid September
Akmola region														
English oak	-	Mid May	Mid May	Mid May	The end of May	The end of May	The end of May	The end of May	The end of May	**Recorded**	**Recorded**	Mid September	Mid September	Mid September

Karaganda region														
Mountain ash	-	Mid May	Mid May	The end of May	The end of May	The end of May	The end of May	**Recorded**	**Recorded**	**Recorded**	**Recorded**	Mid September	Mid September	Mid September
Ulytau region														
White poplar	-	Mid April	End of April	End of April	End of April	End of April	Beginning of May	Mid May	The end of May	**Recorded**	**Recorded**	**Recorded**	Mid September	End of September
Mangistau region														
White poplar	-	Mid April	End of April	End of April	End of April	End of April	Beginning of May	Mid May	The end of May	**Recorded**	**Recorded**	**Recorded**	Mid September	End of September
Atyrau region														
Linden trees	-	Mid May	Mid May	Mid May	The end of May	The end of May	The end of May	The end of May	The end of May	**Recorded**	**Recorded**	Mid September	Mid September	Mid September
West-Kazakhstan region														
Willows	-	Mid April	End of April	Beginning of May	Mid May	Mid May	The end of May	**Recorded**	**Recorded**	End of September	End of September	Early October	Mid October	End of october

Table U.4. - Phenological phases of herbaceous plants, according to observations in 2023.

View	Emergence of seedlings	Budding	Flowering, beginning	Mass flowering	Bloom, end	Seed ripening, beginning	Seed ripening, complete
1	2	3	4	5	6	7	8
Aktobe region							
Dandelion officinalis	Beginning of May	Mid May	The end of May	The beginning of June	End of June	Early July	Mid July
Kyzylorda Region							
Leafless saxaul	Early April	Mid April	End of April	Mid May	**Recorded**	End of September	Early October
Turkestan region							
Salt marsh barnacle, or Biyurgun	Mid June	End of June	Mid July	Early August	**Recorded**	**Recorded**	**Recorded**
Jambyl Region							
Adonis spring, or Goritsvet	End of March	Early April	Mid April	End of April	End of April	End of June	Early July
Almaty region							
Hawthorn	Beginning of May	Mid May	The end of May	The beginning of June	The beginning of June	End of June	Early July
Zhetysu region							
Ferula	Beginning of May	Mid May	The end of May	The beginning of June	The beginning of June	End of June	Early July
East Kazakhstan region							
Mytnik cute	Mid May	The end of May	The beginning of June	Mid June	End of June	Early July	End of July
Abay region							
Superb blackstem	Mid June	Mid June	End of June	Early July	Mid July	**Recorded**	**Recorded**
Pavlodar region							
Meadowsweet	The beginning of June	Mid June	Mid June	End of June	Early July	Mid July	Early August
North-Kazakhstan region							
Coltsfoot	Mid March	Early April	Mid April	Mid April	Mid April	**Recorded**	**Recorded**
Kostanay region							
Sedum	The beginning of June	End of June	Mid July	End of July	**Recorded**	**Recorded**	Early October
Akmola region							
Chicory	Mid May	The end of May	The beginning of June	Mid June	End of June	Early July	End of July
Karaganda region							
Field clover	Early April	Mid April	End of April	Mid May	Recorded	End of Septem-	Early October

View	Emer-gence of seedlings	Budding	Flowering, beginning	Mass flowering	Bloom, end	Seed rip-ening, beginning	Seed ripening, complete
1	2	3	4	5	6	7	8
						ber	
Ulytau region							
Lobelia urchin	Mid May	Mid May	End of June	End of June	**Rec-orded**	End of Septem-ber	Late Octo-ber
Mangistau region							
Zinnia graceful	Mid March	Mid May	End of June	End of June	**Rec-orded**	End of Septem-ber	Late Octo-ber
Atyrau region							
Anabasis creta-ceous	Mid May	End of June	End of June	Mid Au-gust	**Rec-orded**	**Record-ed**	End of Sep-tember
West-Kazakhstan region							
Feather grass	Mid May	Mid May	End of June	End of June	Record-ed	End of Septem-ber	Late Octo-ber

Table U.5 - Productivity of trees and shrubs (in points), according to observation data in 2023.

View	Inspection area 1		Inspection area 2	
	Productivity in points on the phenological site	Productivity in points for the area as a whole	Productivity in points on phenological site	Productivity in points per plot in general
1	2	3	4	5
Aktobe region				
Hawthorn	5	5	-	-
Kyzylorda Region				
Small leaf maple	4	5	-	-
Turkestan region				
Apple tree	5	6	-	-
Jambyl Region				
Elm	3	4	-	-
Almaty region				
Red maple	4	5	-	-
Zhetysu region				
Small-leaved linden	3	4	-	-
East Kazakhstan region				
Pine	5	6	-	-
Abay region				
Cedar	5	5		-
Pavlodar region				
Aspen pegs	5	5	-	-
North-Kazakhstan region				
Silver birch	5	5	-	-
Kostanay region				
Pine	4	5	-	-
Akmola region				
English oak	2	4	-	-
Karaganda region				
Mountain ash	4	5	-	-
Ulytau region				
White poplar	2	4	-	-
Mangistau region				
White poplar	3	4	-	-
Atyrau region				
Linden	4	5	-	--
West-Kazakhstan region				
Willow	5	5	-	-

Appendix D 1

Ecological passport of the river Syrdarya

General information about the reservoir

Name:	River system (to which catchment does the water body belong):	Main river or tributary (what order)	Where does the river begin (source)	Where does it flow (mouth)	Approximate area of the reservoir or length of the river	Located on the territory (districts, nearby settlements)	What tributaries does it receive: right: left:	Are there dams, dams, where are	For artificial watercourses (canals, ditches):	The nature of the watercourse (dug, concrete banks, etc.)	When was it created	Why was it created
1	2	3	4	5	6	7	8	9	10	11	12	13
Kyzylorda region (Syrdarya river)												
Syrdarya	The water body belongs to the Aral Sea basin	The largest tributaries are the Naryn and Karadarya rivers	The source originates at the junction of the Naryn and Kardarya rivers, in the Fergana Valley region.	Small Aral Sea	Square swimming pool 219,000 km². The length of the river reaches 2212 km	The Syrdarya contains 3 regions of Kyrgyzstan: Naryn, Jalalabad and Osh, Sughd region of Tajikistan, 6 regions of Uzbekistan: Andijan, Namangan, Fergana, Tashkent, Jizzakh and Syrdarya	The left tributaries of the Syrdarya are Isfayramsay, Shakhimardan, Sokh, Isfara and Khojabakirgan. The last tributary is the Arys, which is the right tributary of the Syrdarya.	Kyzylorda hydroelectric complex on the river. The Syr Darya in Kazakhstan consists of a dam to regulate water flow along the river, as well as two canals: the right channel, 80 km long, originates at the dam (12 km from the city of Syr Dar-	Zhanadarya Canal (Kazakh: Zhanadaria canals) is an artificial watercourse located on the left bank of the Syrdarya River , which passes through the territory of the Ky-	Concrete banks	The Zhanadari Canal was put into operation in 1958.	This canal has 19 hydraulic structures and operating branches with a total length of about 150 kilometers. The canal is designed to supply water for watering pastures in the north of the Kyzylkum sandy desert and irrigate crops fodder and vegetable and melon crops, as well as watering natural forage lands

Name:	River system (to which catchment does the water body belong):	Main river or tributary (what order)	Where does the river begin (source)	Where does it flow (mouth)	Approximate area of the reservoir or length of the river	Located on the territory (districts, nearby settlements)	What tributaries does it receive: right: left:	Are there dams, dams, where are	For artificial watercourses (canals, ditches):	The nature of the watercourse (dug, concrete banks, etc.)	When was it created	Why was it created
1	2	3	4	5	6	7	8	9	10	11	12	13
						and two regions of Kazakhstan: Turkestan and Kyzylorda.		ya). Kyzylorda), built in 1957 in the river bed. Syrdarya, stretches along the right side to the Karmakshinsky district .	zylorda region Republic of Kazakhstan .			
Characteristics of the reservoir/river and its valley at the study site												
Description of the location of the river section under study (upstream/closer to the source, middle, lower/closer to the mouth;	Observation sampling station location	Features of the river valley: width and shape	The presence of terraces, their number, what rocks they are composed of	Vegetation along the banks and slopes of the valley	River floodplain: width, vegetation, constituent rocks	Springs in the river valley (number, location)	River bed: width, depth, maximum, average	The presence of islands, fords, channels, rifts and their location	Features of the bottom soil	Water consumption		Assessment of water quality (can be used: turbidity, color, sediment, transparency, odor, temperature.

Name:	River system (to which catchment does the water body belong):	Main river or tributary (what order)	Where does the river begin (source)	Where does it flow (mouth)	Approximate area of the reservoir or length of the river	Located on the territory (districts, nearby settlements)	What tributaries does it receive: right: left:	Are there dams, dams, where are	For artificial watercourses (canals, ditches):	The nature of the watercourse (dug, concrete banks, etc.)	When was it created	Why was it created
1	2	3	4	5	6	7	8	9	10	11	12	13
Researched upper part of the river	Karmakshinsky district, Kyzylorda region, 45.468256, 64.066397	The river has a width 150-200 m	The terrace of the Syr Darya River (ancient alluvial) extends from east to west.	In the western part of the valley in the mountain semi-desert belt, wormwood - hodgepodge associations are developed. The Syrdarya valley is dominated by sandy tugai plant complex, closer to the foothills - ephemeral vegetation. In some places it is overgrown with reeds and riparian trees. The vegetation on the territory is desert and semi-desert, represented by shrubs (zhyngyl, dzhuzgun), up to 2 m high,	In the lower reaches of the Syrdarya River, in the area from the city of Turkestan to the regional center of Zhosaly, there is a vast floodplain (10-50 km wide, about 400 km long), penetrated by many channels, in places overgrown with reeds and tugai, widely used for agriculture (rice growing, melon growing, vegetable growing, gardening in some places).	During the study, no springs were identified.	The main channel of the Syrdarya River from the city of Kyzylorda to the Karaozek station has an average width of 300 m (at flood it reaches 735 meters) and an average depth of 3.85 meters, and the deepest in this section is 12.5 meters. The riverbed is winding and unstable.	During the study, islands and channels were not identified	The bottom soil is sandy and silty.	The average long-term water flow is 724 m³/s.		Turbidity is high – 2000 g/. On average - 17.9 ° C, in September - 11.4 ° C. Mineralization of river water at observation stations in the summer was - 2200 mg/dm³

Name:	River system (to which catchment does the water body belong):	Main river or tributary (what order)	Where does the river begin (source)	Where does it flow (mouth)	Approximate area of the reservoir or length of the river	Located on the territory (districts, nearby settlements)	What tributaries does it receive: right: left:	Are there dams, dams, where are	For artificial watercourses (canals, ditches):	The nature of the watercourse (dug, concrete banks, etc.)	When was it created	Why was it created
1	2	3	4	5	6	7	8	9	10	11	12	13
				subshrubs (boyalych, biyurgun, wormwood) up to 0.5 m high and herbs (fescue, feather grass). Camel thorn (zhantak) is widespread. In the floodplain of the river. Along the Syrdarya River and on the islands, there is woody vegetation (willow, poplar, oleaster (dzhida) and continuous thickets (tugai) of thorny bushes up to 5 m high. Throughout the floodplain, and especially in wetlands, reeds 5 m high grow,								

Name:	River system (to which catchment does the water body belong):	Main river or tributary (what order)	Where does the river begin (source)	Where does it flow (mouth)	Approximate area of the reservoir or length of the river	Located on the territory (districts, nearby settlements)	What tributaries does it receive: right: left:	Are there dams, dams, where are	For artificial watercourses (canals, ditches):	The nature of the watercourse (dug, concrete banks, etc.)	When was it created	Why was it created
1	2	3	4	5	6	7	8	9	10	11	12	13
				forming impenetrable thickets.								

Life in and around a pond

Coastal vegetation (indicate dominant and rare species)	Aquatic and bottom vegetation (dominant and rare species)	degree of channel overgrowth (% area)	Fish: common species, rare species	Crayfish (presence and quantity)	Animals, birds, their traces	Invertebrate animals on the banks of a pond
Piedmont dandelion, Kermek schoolleaf, Violet astragalus	Reed reeds and floodplains	The degree of overgrowth is up to 5% in the study area	Snakehead, Bream, Asp, Roach, Rudd, Common Pike, Common Pike-perch. Black carp is a rare species.	No cancer was found during the study.	Geese Ducks long eared hedgehog green toad Yellow gopher Moorhen Common cuckoo Common fox	Rotifers – 14 taxa, Cladocerans – 4 and copepods – 4. Temporary plankters - larvae of bivalves and chironomids, worms of H. diversicolor

Using of the reservoir and its valley and its environmental consequences

What settlements are located in the valley of the reservoir and along the banks, at what distance from the reservoir	Industrial and agricultural enterprises, their location in relation to the reservoir	What agricultural land and what area does it occupy	How the pond and valley are used for recreation	Is the reservoir used for industrial or agricultural purposes	Is the reservoir used for water supply and other domestic needs
Syrdarya, 215 km south of the border of the Kyzylorda and Turkestan regions (northern point - 430 13' 7.523"), as well as along the floodplain of the river. Arys at a distance of about 60 km east of its confluence with the river. Syrdarya. On the banks of the Syrdarya there are the cities of Shardara, Kyzylorda, Dzhalagash, Dzhusaly, Baikonur, Kazalinsk (Kazakhstan).	In the lower part of the Syr Darya basin, Kazakhstan conducts large-scale uranium mining using the in-situ leaching method.	The Syrdarya River is widely used for agriculture (rice growing, melon growing, vegetable growing, and in some places gardening). At the mouth of the Syrdarya it forms a delta (near the city of Kazalinsk) with numerous channels, lakes and swamps, used for melon growing.	The Syrdarya River is navigable; tourists who like active recreation, fishing and hunting, as well as local residents, like to relax on its banks.	One of the largest reservoirs in the country, Shardara, was also built on the river. Syrdarya. The waters of the Syr Darya are mainly used for irrigation, which is why its volume decreases from year to year.	The operation of reservoirs on the Naryn River (the largest tributary flowing through the territory of Kyrgyzstan and Uzbekistan), in particular the Toktogul reservoir in Kyrgyzstan, is of utmost importance for providing water for large irrigation systems for cotton growing and, to a lesser extent, for growing food crops in the Fergana Valley and downstream in Uzbekistan and Kazakhstan. At the same time, it is extremely important for the production of electricity upstream, mainly in Kyrgyzstan. Other large reservoirs in the basin are Andijan on the Karadarya River (Uzbekistan), Kairakkum on the Syrdarya (Tajikistan), Charvak on the Chirchik River, as well as Shardara and Koksarai on the Syrdarya (Kazakhstan). These reservoirs are used mainly for irrigation and flood control, although some of them also have hydroelectric power plants. Reservoirs regulate about 90 percent of the average annual flow of the Syrdarya.

Sources of river pollution, water protection measures

Natural sources and causes of changes in water quality.	Anthropogenic sources of reservoir pollution.	Where are the dumping points for untreated water?	Where are the discharge points for treated wastewater? What measures are taken to clean them?	What is the width of the environmental protection zone of the reservoir.	What is the condition? Your proposals for the protection and rational use of the reservoir and the surrounding area.	What has been done to clean up the reservoir and its banks?	Who drew up the passport (last name, first name, patronymic, age, occupation)
Large changes in water quality are associated with anthropogenic factors.	Due to the discharge of wastewater from petrochemical, chemical, light industry enterprises and collector-drainage waters from rice and cotton fields, the ecological situation of the river is worsening.	By its type of activity, Kazakhtelecom JSC does not discharge into water bodies. Discharges of collector and drainage water from agricultural fields with a high content of pesticides and mineral salts have a significant impact on water quality. To the territory of the Kyzylorda region in the river. The Syrdarya discharges wastewater from 140 collectors with a total volume of 10-12 km3. On the territory of the region, discharge is carried out from three collectors: K-1 right-bank Tugusken massif, K-2 left-bank Tugusken massif and Kuksuy discharge collector.	According to the type of its activities, JSC Kazakhtelecom does not discharge into water bodies. Compliance with VAT standards in real time using AMS. Destruction (reduction) of the total microbial number in wastewater to standard values.	Water protection zones and strips of the Syrdarya River in the territories of the Kyzylorda region. **Syrdarya district** The area of the water protection zone and strip is 6962.5 hectares; The width of the water protection zone is 500 meters. **Shieli district** The area of the water protection zone and strip is 25979.9 hectares; The width of the water protection zone is 500 m.	In recent years, the water quality of the river. Syrdarya, especially within the Kyzylorda region, does not meet sanitary and epidemiological standards (the total number of bacteria in some cases exceeds the maximum permissible concentration tens of times the standards) for the content of harmful substances in the water of reservoirs for domestic and fishery water use. ***Improving*** and applying water protection measures with the introduction of new equipment and environmentally and epidemiologically safe technologies; carrying out state and other forms of control over the use and protection of water bodies.	Information is absent	Ayazhan Askarkyzy

Appendix D 2

Ecological passport of the river Chu

General information about the reservoir

Name:	River system (to which catchment does the water body belong):	Main river or tributary (what order)	Where does the river begin (source)	Where does it flow (mouth)	Approximate area of the reservoir or length of the river	Located on the territory (districts, nearby settlements)	What tributaries does it receive: right: left:	Are there dams, dams, where are	For artificial watercourses (canals, ditches):	The nature of the watercourse (dug, concrete banks, etc.)	When was it created	Why was it created
1	2	3	4	5	6	7	8	9	10	11	12	13
Zhambyl region (Chu River)												
Chu	The Shu River belongs to the Shu-Talas natural-economic system (NES)	Main tributaries: Chon-Kemin, Yrgaity, Kakpatas; cAlamedin, Aksu, Kuragaty	The Shu (Chu) River comes from the confluence of the Zhuanaryk and Koshkar rivers	The river flows into the lake systems Ashikol and Akzhaikyn.	Square swimming pool 67,500 km² The length of the river reaches 1186 km2	On the Chu River there are settlements: the Kyrgyz Kochkorka, Kemin, Tokmak and the Kazakh Kordai, Shu, Tole Bi.	On the right - Chon-Kemin, Yrgaity, Kakpatas, on the left - Alamedin, Aksu, Kuragaty.	There is a Tasotkel dam on the territory of Kazakhstan. For irrigation, the Eastern and Western Big Shu, the Shu, Sortobe, Georgievka, Atbashi and other canals, and small hydroelectric power stations are used.	In Kazakhstan there are canals Shu, Sortobe, Georgievka, Atbashi, etc. The Chui Canal is intended for irrigating pastures and irrigating agricultural lands of farms in the Zhambyl region. It starts from the ring part along the Shu River and stretches to the Moyynkum, Betpakdala re-	Concrete banks	The dam was built on the Shu River in the Zhambyl region. Commissioned in 1974	The water is also used for irrigating farmland in the Shu and Moyynkum districts of the Zhambyl region. In 2012-2013, a hydroelectric power station was added to the dam. Power - 9.2 MW, average annual output - 45.6 million kW · h. Launched May 16, 2013

									gion. In Kyrgyzstan, the irrigation and irrigation canal BChK (Big Chui Canal) was built in 1958			
Characteristics of the reservoir/river and its valley at the study site												
Description of the location of the river section under study (upstream/closer to the source, middle, lower/closer to the mouth;	Observation sampling station location	Features of the river valley: width and shape	The presence of terraces, their number, what rocks they are composed of	Vegetation along the banks and slopes of the valley	River floodplain: width, vegetation, constituent rocks	Springs in the river valley (number, location)	River bed: width, depth, maximum, average	The presence of islands, fords, channels, rifts and their location	Features of the bottom soil	Water consumption	Assessment of water quality (can be used: turbidity, color, sediment, transparency, odor, temperature.	
Researched middle part of the river	43.271974, 74.203983 Dzhambul region, the city of Chu is located	The river valley is trough-shaped, asymmetrical, 3-3.5 km wide.	From the Boom Gorge, the Chu River flows for more than 10 km in a relatively narrow valley, clinging more to the left	In the river valley Chu, on soils that are saline to varying degrees, schrenkiana wormwood-saltwort-zhantak communities with shrubs (Artemisia	The floodplain is 400-500m wide, meadow vegetation.	During the study, no springs were identified.	The river flows from north to south. But along its entire length the riverbed	During the study of the islands, no channels were identified.	Silty soil of the river bottom	The average annual water flow when leaving the mountains is about 130 m³/s, sedi-	According to a visual inspection of the Chu River, the water is of a natural color, has no foreign odor, and no uncharacteristic phenomena were de-	

	in the south of Kazakh-stan		slope so that the flat spaces of terraces are developed mainly along the right bank. Between the exit from the Boom Gorge and the urban settlement. Kemin, in the transverse pro-file of the val-ley, in addition to the flood-plain, 5 more terraces are outlined with heights of 5, 15, 20, 65 and 80 m above the river level (M.M. Resh-etkin, 1933). In the area of ur-ban settlement Kemin, on both banks of the river, three lower terraces are developed.	schrenkiana, Petro-simonia oppositiflo-ra, Climacoptera brachiata, Alhagi pseudoalhagi, Hal-imodendron halodendron, Tamarix ramosissi-ma, etc.) are wide-spread in patches. The total projective cover is 75-80%, the height of the shrub layer is 150-250 m, the average height of wormwood and zhantak ranges from 40-60 cm, the height of the lower solyanka layer is 10-20 cm. The total projective cover of saltpeter grass, which is ubiquitous in the same habitats -petrosimonium-licorice and sveda communities make up 80%, Solyanka and forbs, such as species of clima-coptera, parfolia, kermeka, zhantak, etc., participate in the composition of the herbage com-munities.			winds, turns now to the right, now to the left, rushes be-tween high rocks, spills over valleys, and forms several channels and oxbow lakes. The river bed is winding.			ment flow is about 60 kg/s.	tected

Life in and around a pond

Coastal vegetation (indicate dominant and rare species)	Aquatic and bottom	degree of channel overgrowth (% area)	Fish: common species, rare species	Crayfish (presence and quantity)	Animals, birds, their traces	Invertebrate animals on the banks of a pond
Honeysuckle; Sorrel; Thistle; Wild currant	Seaweed Reeds	The degree of over-growth is up to 3.5% in the study area	Common pike Perch. Rudd Bream. Minnow. Tench. Aral spined loach	No cancer was found during the study.	Jerboas. Eared hedgehogs. Remes. Bustards.	Rotifers

Using of the reservoir and its valley and its environmental consequences

What settlements are located in the valley of the reservoir and along the banks, at what distance from the reservoir?	Industrial and agricultural enterprises, their location in relation to the reservoir	What agricultural land and what area does it occupy?	How the pond and valley are used for recreation	Is the reservoir used for industrial or agricultural purposes?	Is the reservoir used for water supply and other domestic needs?
On the Chu River there are settlements: the Kyrgyz Kochkorka , Kemin , Tokmak and the Kazakh Kordai , Shu , Tole Bi .	There are 80 large and small industries on the river, the largest (in Kazakhstan): Koragaty, Merke, Karabalta, Aksu, etc.	For irrigation, the Eastern and Western Big Shu, the Shu, Sortobe, Georgievka, Atbashi and other canals, and small hydroelectric power stations are used.	The Chu River is an ideal vacation spot for lovers of secluded fishing. The Chu mountain current attracts rafting enthusiasts to it. At the same time, on the river you can find places for rafting for extreme sports enthusiasts of all skill levels.	The Chu River is an important water source for agriculture and industry.	There are two reservoirs on the river - Orto-Tokoy (Kyrgyzstan) and Tasotkel (Kazakhstan), as well as numerous irrigation canals (55% of the flow is spent on irrigation). A hydroelectric power station was launched on the dam of the Tasotkel reservoir on May 16, 2013: capacity - 9.2 MW, average annual production - 45.6 million kW · h

Sources of river pollution, water protection measures

Natural sources and causes of changes in water quality.	Anthropogenic sources of reservoir pollution.	Where are the dumping points for untreated water?	Where are the discharge points for treated wastewater? What measures are taken to clean them?	What is the width of the environmental protection zone of the reservoir	What is the condition? Your proposals for the protection and rational use of the reservoir and the surrounding area	What has been done to clean up the reservoir and its banks	Who drew up the passport (last name, first name, patronymic, age, occupation)
Climate change leads to water shortages in some areas of Central Asia, as well as changes in river regime. As temperatures rise, the area around Chu becomes increasingly arid, while the population along the banks grows.	The main sources of water pollution are enterprises of the mining industry, mechanical engineering, non-ferrous and ferrous metallurgy, building materials, fuel and food industries, agriculture, public utilities. One of the reasons for the pollution of surface waters coming from the territory of the Kyrgyz Republic is the flow of industrial and economic activities. domestic wastewater into the Shu River and its tributaries from the industrial region of the Kyrgyz Republic. Annual observations of the quality of water coming from the territory of the Republic of Kyrgyzstan show a high level of excess of background indicators, since wastewater (industrial and domestic) from the industrial region of the Republic of Kyrgyzstan is discharged into the Shu River or its tributaries.	According to the type of its activity, JSC Kazakhtelecom does not discharge into water bodies/ Centralized collection and treatment of wastewater is organized by local utility companies in the city of Shu, Kyzymshek and Taukent.	According to the type of its activity, Kazakhtelecom JSC does not discharge into water bodies/ Centralized collection and treatment of wastewater is organized by local utility companies in the city of Shu, Kyzymshek and Taukent.	Water protection zone 500m.	Prevent wastewater discharges onto terrain or water bodies, effectively drain surface water from the territory of an industrial enterprise, and prevent discharges into the Shu River.	Information is absent	Ayazhan Askarkyzy

Appendix D 3

Ecological passport of the river Tobol

General information about the reservoir

Name:	River system (to which catchment does the water body belong):	Main river or tributary (what order)	Where does the river begin (source)	Where does it flow (mouth)	Approximate area of the reservoir or length of the river	Located on the territory (districts, nearby settlements)	What tributaries does it receive: right: left:	Are there dams, dams, where are	For artificial watercourses (canals, ditches):	The nature of the watercourse (dug, concrete banks, etc.)	When was it created?	Why was it created?
1	2	3	4	5	6	7	8	9	10	11	12	13
(Tobol River)												
Tobol	Irtysh → Ob → Kara Sea	The largest tributaries in within the Kostanay region - Zhelkuar, Ayat, Ubagan, Uy, as well as several temporary watercourses up to 10 km long.	The Tobol is formed at the confluence of the Bozbie River with the Kokpektysai River on the border of the eastern spurs of the Southern Urals and the Turgai mesa of the country.	The river flows into the Irtysh.	Square swimming pool 426,000 km². The length of the river reaches 1591 km.	On the Tobol River there are cities - centers of mining and industry: in Kazakhstan - Lisakovsk, Rudny, Kostanay, in Russia - Kurgan, Tobolsk and Yalutorovsk.	The largest tributaries of the river: on the left - Uy, Iset, Tura, Tavda (the last two are of navigable importance); on the right is Ubagan .	No dams or dams were identified during the study.	Karatomar Reservoir	Concrete banks	Built in 1966 in connection with the development of Sokolovskoye, Sarybaiskoye, Kacharskoye and other deposits and the provision of water to the city of Rudny . Built on the Tobol River , the river flows into the reservoir from the west Ayat .	In addition to water supply to populated areas, water is used for irrigation of agricultural lands and fishing.

Characteristics of the reservoir/river and its valley at the study site											
Description of the location of the river section under study (upstream/closer to the source, middle, lower/closer to the mouth;	Observation sampling station location	Features of the river valley: width and shape	The presence of terraces, their number, what rocks they are composed of	Vegetation along the banks and slopes of the valley	River floodplain: width, vegetation, constituent rocks	Springs in the river valley (number, location)	River bed: width, depth, maximum, average	The presence of islands, fords, channels, rifts and their location	Features of the bottom soil	Water consumption	Assessment of water quality (can be used: turbidity, color, sediment, transparency, odor, temperature.
Researched Upper part of the river	Beimbeta Mailina district, Kostanay region Coordinates: 52.864785, 62.812282	The river valley is trapezoidal, 3.5 – 4.0 km wide.	The left slope is steep, terraced, cut by beams, composed of sandy loam and loam, and is occupied by urban development. s. The right slope is gentle, overgrown with forbs.	Banks with rich coastal vegetation. The vegetation of the Tobol River valley and its tributaries is represented by tree-shrub, steppe, meadow, coastal-water and aquatic communities. The slopes of the valley are weakly dissected by hollows and small ravines.	The floodplain of the river is right bank, up to 3 km wide, moderately rugged, composed of sandy loam, meadow, in places overgrown with bushes, used for orchards and vegetable gardens. Water enters the floodplain at a level of 370 cm	During the study, no springs were identified.	The river bed is moderately winding. The width of the channel varies from 50 m in the upper reaches to 400 m in the lower reaches - slightly below the confluence with the Tavda. The smallest depth in the rifts is only about 35 cm, the greatest in the reaches is up to 12 m.	During the study, islands and channels were not identified	The river bottom is flat, sandy and pebble.	Water flow: average - in the upper reaches 26.2 m ^{3}/sec and at the mouth 805 m ^{3}/sec, maximum - 348 and 6350 m, respectively ^{3}/sec.	Average turbidity: 260 g/ ^{m3}.

Life in and around a pond

Coastal vegetation (indicate dominant and rare species)	Aquatic and bottom vegetation (dominant and rare species)	degree of channel overgrowth (% area)	Fish: common species, rare species	Crayfish (presence and quantity)	Animals, birds, their traces	Invertebrate animals on the banks of a pond
Real meadows. -Steppe meadows Swampy meadows **birch forests**	Reed Scirpus lacustris L. White water lily Swamp grass Susak umbrella Elodea canadensis Michx.). *Rare species:* pure white water lily (Nymphaea candida) and egg pods (Numpharluteus)	The degree of overgrowth is up to 15% in the study area	The total number of fish species in the Tobol River was 13 species. Of 13 species in total 11 are commercial, with high numbers and wide distribution There are only 4 species: roach, perch, pike and bream.	No cancer was found during the study.	Viper Snake Freshwater Toads Ducks Herons	Arthropods, molluscs and roundworms; Misids Gammarus Smooth bugs

Using of the reservoir and its valley and its environmental consequences

What settlements are located in the valley of the reservoir and along the banks, at what distance from the reservoir	Industrial and agricultural enterprises, their location in relation to the reservoir	What agricultural land and what area does it occupy	How the pond and valley are used for recreation	Is the reservoir used for industrial or agricultural purposes	Is the reservoir used for water supply and other domestic needs
Denisovka, Lisakovsk, Rudny, Kostanay, Kurgan, Yalutorovsk.	On **the Tobol River** there are cities - centers of mining and **industry** : in Kazakhstan - Lisakovsk, Rudny, Kostanay. The largest representatives of the industry are Kostanay MBI LLP, a house-building plant, BK-Stroy LLP, Rudny Cement Plant LLP, Romana-Group LLP	The waters of the Tobol River are used to irrigate fields and water livestock.	The Tobol River is of great recreational importance and serves as a place amateur fishing associated with outdoor activities.	The waters of the Tobol River are used to irrigate fields and water livestock. Tobol is also used for timber rafting. River fishing.	In Kazakhstan, Karatomarskoe and Verkhnetobolsk reservoir. There is also navigation 470 kilometers from the mouth. The waters of the Tobol River basin are used for water supply. In a number of settlements the river is a drinking reservoir.

Sources of river pollution, water protection measures

Natural sources and causes of changes in water quality.	Anthropogenic sources of reservoir pollution.	Where are the dumping points for untreated water?	Where are the discharge points for treated wastewater? What measures are taken to clean them?	What is the width of the environmental protection zone of the reservoir.	What is the condition? Your proposals for the protection and rational use of the reservoir and the surrounding area.	What has been done to clean up the reservoir and its banks?	Who drew up the passport (last name, first name, patronymic, age, occupation)
Natural factors include the presence of increased concentrations of metals in the geological mountain-fold substrate and soils. These substances are also present in groundwater involved in overgrowth. submerged aquatic vegetation, which, after dying, accumulates on the bottom and gradually decomposes, which complicates the process of destruction of organic matter. feeding the river.	Water quality is negatively affected by discharges of industrial and domestic untreated or insufficiently treated wastewater, washouts of fertilizers and other pollutants from agricultural fields and lands during spring floods and summer rain floods, as well as emissions of huge amounts of pollutants into the atmosphere. The presence of enterprises in construction materials, mining, fuel industries, and urban agglomerations has a significant impact on the quality of surface water bodies.	According to the type of its activity, Kazakhtelecom JSC does not discharge into water bodies	According to the type of its activity, Kazakhtelecom JSC does not discharge into water bodies	Tobol River The width of the water protection zone is 400-1600. Width of water protection strip.	Development of measures to reduce the entry of metal ions into water; Development of optimal and acceptable methods of combating blue-green algae, which during periods of shallow water and intense blooms significantly worsen water quality.	Information is absent	Ayazhan Askarkyzy

Appendix D 4

Ecological passport of the river Ory

General information about the reservoir

Name:	River system (to which catchment does the water body belong):	Main river or tributary (what order)	Where does the river begin (source)	Where does it flow (mouth)	Approximate area of the reservoir or length of the river	Located on the territory (districts, nearby settlements)	What tributaries does it receive: right: left:	Are there dams, dams, where are	For artificial watercourses (canals, ditches):	The nature of the watercourse (dug, concrete banks, etc.)	When was it created?	Why was it created?
1	2	3	4	5	6	7	8	9	10	11	12	13
General information about the reservoir (Or River)												
Or River	Or is a river in the Ural basin.	Tributaries: 38 km: Mendybay 66 km: Ashchebutak 69 km: Kamsak 110 km: Mamyt	Formed at the confluence of the Shiyli and Terisbutak rivers, originating on the western slopes of Mugodzhar	Flows into the Ural River , at the confluence is the city of Orsk	River length: 332 km Basin:18,600 km²	Flows through the Mugalzharsky and Khromtau districts of the Aktobe region , in Kazakhstan .	Tributaries: 38 km: Mendybay 66 km: Ashchebutak 69 km: Kamsak 110 km: Mamyt	Reservoirs with earthen dams were built on the river.	No channels were identified during the study	Concrete banks	-	-
Characteristics of the reservoir/river and its valley at the study site												
Description of the location of the river section under	Observation sampling station location	Features of the river valley: width and shape	The presence of terraces, their number, what rocks they are composed of	Vegetation along the banks and slopes of the valley	River floodplain: width, vegetation, constituent rocks	Springs in the river valley (number, location)	River bed: width, depth, maximum, average	The presence of islands, fords, channels, rifts and their loca-	Features of the bottom soil	Water consumption		Assessment of water quality (can be used: turbidity, color, sediment, transparency,

study (up-stream/closer to the source, middle, lower/closer to the mouth;								tion			odor, temperature.
Researched middle part of the river	Khromtau district, Aktobe region Coordinates: 50.125679, 59.085216	The valley is wide (1 - 3 km), reaching 18 - 20 km at the mouth. The banks of the river are low, flat, and steep in places.	Loose sandy-clayey marine and alluvial sediments formed a number of terraces. Of these, the lower one is a meadow terrace, which is not flooded by spring waters only in the most dry years, and has an average height of 3 to 6 m above the modern river bed.	Tatarian quinoa, sandy stag, Grebenshchik	The floodplain is open, 0.5 - 0.1 km wide, in some areas covered with sandy deposits.	During the study, no springs were identified.	A channel is a natural depression created by a river.	During the study, islands and channels were not identified	The river bottom is sandy.	Water flow: 21.3 m³/s (61 km from the mouth) Average annual water flow from 4.05 m3/s (near the village of Kopa), downstream to 13.0 m3/s (near the village of Mailitobe).	The smell of sludge. Water temperature 26ºC Color greenish

Life in and around a pond

Coastal vegetation (indicate dominant and rare species)	Aquatic and bottom	degree of channel overgrowth (% area)	Fish: common species, rare species	Crayfish (presence and quantity)	Animals, birds, their traces	Invertebrate animals on the banks of a pond
Oriental mortuk, pierced bedbug Petrosimonia tristamen	Reed Water lily	The degree of overgrowth is up to 5% in the study area	Crucian carp, catfish, pike, carp, etc.	No cancer was found during the study.	Ducks, herons, geese, ground squirrel, hare, gerbils, jerboa, frogs	Bugs and beetles, oligochaete worms Limnodrilus hoffmeisteri

Using of the reservoir and its valley and its environmental consequences

What settlements are located in the valley of the reservoir and along the banks, at what distance from the reservoir	Industrial and agricultural enterprises, their location in relation to the reservoir	What agricultural land and what area does it occupy	How the pond and valley are used for recreation	Is the reservoir used for industrial or agricultural purposes	Is the reservoir used for water supply and other domestic needs
Bogetsay village Koktau village Kuduksay village Kopa village Oysylkara village.	Main industries: Kamysakty, Oysylkara.	The Or River is used for gardening, fish farming	The Or River is a popular fishing spot for fishermen.	The Or River is used for gardening, fishing, as well as organizations involved in watering pastures.	River water is used for household needs. Reservoirs with earthen dams have been built on the river.

Sources of river pollution, water protection measures.

Natural sources and causes of changes in water quality.	Anthropogenic sources of reservoir pollution.	Where are the dumping points for untreated water?	Where are the discharge points for treated wastewater? What measures are taken to clean them?	What is the width of the environmental protection zone of the reservoir.	What is the condition? Your proposals for the protection and rational use of the reservoir and the surrounding area.	What has been done to clean up the reservoir and its banks?	Who drew up the passport (last name, first name, patronymic, age, occupation)
Large changes in water quality are associated with anthropogenic factors, but there are also heavy rains that also pollute water bodies.	The main sources of river pollution are enterprises and agriculture.	According to the type of its activities, Kazakhtelecom JSC does not discharge into water bodies	According to the type of its activities, Kazakhtelecom JSC does not discharge into water bodies	Placement of summer cottages and garden plots with the width of water protection zones less than 100 m and the steepness of the slopes of adjacent areas more than 3 degrees;	I recommend reducing the anthropogenic load on the river, as well as reducing the volume of pollutants entering the water body through farming and industry, ensuring the protection of the population and agricultural land	Information is absent	Ayazhan Askarkyzy (Environmental engineer, 23 years old)

Appendix D 5

Ecological passport of the river Bukhtarma

General information about the reservoir

Name:	River system (to which catchment does the water body belong):	Main river or tributary (what order)	Where does the river begin (source)	Where does it flow (mouth)	Approximate area of the reservoir or length of the river	Located on the territory (districts, nearby settlements)	What tributaries does it receive: right: left:	Are there dams, dams, where are	For artificial watercourses (canals, ditches):	The nature of the watercourse (dug, concrete banks, etc.)	When was it created?	Why was it created?
1	2	3	4	5	6	7	8	9	10	11	12	13
General information about the reservoir (Bukhtarma River)												
Bukhtarma River	Irtysh → Ob → Kara Sea	Right tributary of the Irtysh	The source is in the glaciers of the Southern Altai ridge.	Flows into the Bukhtarma Reservoir	Length 336 km Basin 12,660 km²	The Bukhtarma River is located on the territory of the East Kazakhstan region	Right tributaries: Chindagatuy Belaya Berel, Chernovaya, Kaurikha, White, Yazovaya, Chernevaya, Khamir, Turgusun Bobrovka. Left tributaries: Sobache, Sogornaya (Sarymsak), Yachmyonka.	The Bukhtarminskaya HPP was built as a dam.	There are several bridges on the Bukhtarma river (from top to bottom): from Ust-Chindagatuy to Archaty - 2 bridges, in the village of Archaty two more bridges (above and below the village), then all the bridges are concrete: in the village of Berel, in the village. Zhan-Ulgo (Kiinzhira), in the village of Pechi,	-	Bukhtarma reservoir created in 1960-1964	During the construction of the Bukhtarma hydroelectric power station for electricity generation, water supply to cities and industrial enterprises, shipping, and development of fisheries.

									in Lesnaya Pristan, Zubovka, Parygino and in Snegi-revo\Turgusun (called "Bridge of Communards-			
Characteristics of the reservoir/river and its valley at the study site												
Description of the location of the river section under study (upstream/closer to the source, middle, lower/closer to the mouth;	Observation sampling station location	Features of the river valley: width and shape	The presence of terraces, their number, what rocks they are composed of	Vegetation along the banks and slopes of the valley	River floodplain: width, vegetation, constituent rocks	Springs in the river valley (number, location)	River bed: width, depth, maximum, average	The presence of islands, fords, channels, rifts and their location	Features of the bottom soil	Water consumption	Assessment of water quality (can be used: turbidity, color, sediment, transparency, odor, temperature.
Researched middle part of the river	Katon-Karagay district, East Kazakhstan region Coordinates: 49.206511,	The Bukhtarminskaya valley in the middle part of its course is from 1½ to 5 versts wide; directly above the river rise	The bottom of the valley is composed of slightly hilly terraces, gently sloping towards the river bed	The Bukhtarminskaya valley is the longest of the longitudinal valleys of Altai (280 versts in length) and, at the same time, the most fertile and rich in vegetation. The forests on the mountain slopes of the valley in its	Vegetation is represented by mountain herbs, shrubs and mixed forest	During the study, no springs were identified.	The river bed is straight	During the study, islands and channels were not identified	Boulder-pebble soil	Water flow 214 m³/s	Crystal clear water milky green water

	84.403 549	steep mountains with cliffs up to 250 m in height above its level, and the peaks of Kholsun at 1800 m (6000 ft absolute height)		middle part consist of larch, Siberian pine, birch, aspen, rowan; At the bottom of the valley grow poplars, bird cherry, honeysuckle, boyar, black currant, rose hips, acacia, wild peach							

Life in and around a pond

Coastal vegetation (indicate dominant and rare species)	Aquatic and bottom	degree of channel overgrowth (% area)	Fish: common species, rare species	Crayfish (presence and quantity)	Animals, birds, their traces	Invertebrate animals on the banks of a pond
Fir, pines, larches, birches, currants, rose hips, hops, etc. grow here.	Sedge, arrowhead, chastuha	The degree of overgrowth is up to 40% in the study area	Pike-perch, pike, roach, perch, ripus, crucian carp, spotted sculpin	No cancer was found during the study.	Muskrat, American mink and river otter, common beaver, chipmunk.	Beetles, butterflies, dragonflies, arachnids

Using of the reservoir and its valley and its environmental consequences

What settlements are located in the valley of the reservoir and along the banks, at what distance from the reservoir?	Industrial and agricultural enterprises, their location in relation to the reservoir	What agricultural land and what area does it occupy?	How the pond and valley are used for recreation	Is the reservoir used for industrial or agricultural purposes?	Is the reservoir used for water supply and other domestic needs?
Novaya Bukhtarma village, Zaisan city, Altai city (formerly Zyryanovsk), Oktyabrsky village, village. Kurchum.	The Bukhtarma Reservoir is one of the main fishing reservoirs in Kazakhstan.	The waters of the reservoir are used to irrigate fields.	Dozens of sanatoriums, boarding houses, houses and recreation centers have been built on the coast of the reservoir.	In the lower reaches of the river there are energy industry facilities; the river and its tributaries are used for irrigation and water supply to populated areas. The Bukhtarma Reservoir is one of the main fishing reservoirs in Kazakhstan.	In the lower reaches of the river there are energy industry facilities; the river and its tributaries are used for irrigation and water supply to populated areas.

Sources of river pollution, water protection measures.

Natural sources and causes of changes in water quality.	Anthropogenic sources of reservoir pollution.	Where are the dumping points for untreated water?	Where are the discharge points for treated wastewater? What measures are taken to clean them?	What is the width of the environmental protection zone of the reservoir.	What is the condition? Your proposals for the protection and rational use of the reservoir and the surrounding area.	What has been done to clean up the reservoir and its banks?	Who drew up the passport (last name, first name, patronymic, age, occupation)
Large changes in water quality are associated with anthropogenic factors.	The main sources of pollution are industrial enterprises and sewage pipes of recreation areas. (Zyryanovsky Mining and Processing Plant, LLP Kazzinc)	According to the type of its activities, JSC Kazakhtelecom does not discharge into water bodies	According to the type of its activities, JSC Kazakhtelecom does not discharge into water bodies.	Water protection zone width 370-592m;	It is recommended to reduce the anthropogenic load on the river, as well as reduce the volume of pollutants entering the water body through farming and industry	Information is absent	Ayazhan Askarkyzy