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TAXONOMIC DIVERSITY OF THE RANUNCULACEAE FAMILY IN THE TOBOL-ISHIM AND TURGAI FLORISTIC DISTRICTS OF KAZAKHSTAN

The purpose of the work is to assess the taxonomic diversity of the *Ranunculaceae* family in the Tobol-Ishim and Turgai floristic regions of Kazakhstan. The work is based on the results of field research (2018–2023), conducted using the traditional route reconnaissance method. Herbarium materials on this family stored in institutions were critically examined: Herbarium of the Institute of Botany and Phytointroduction, Almaty (AA), Herbarium of the Pedagogical Institute named after. U. Sultangazina, Kostanay (KSPI); MSU, Moscow (MW); Herbarium of Higher Plants of the Botanical Institute named after. V. L. Komarova (LE); Herbarium of the Institute of Plant and Animal Ecology, Yekaterinburg (SVER).

As a result of the research, a checklist of plants of the family *Ranunculaceae* was compiled, information about the specific locations of species in this territory is provided. In total, 37 species from 14 genera are given for the Tobol-Ishim floristic region. For the Turgai floristic region, 10 species from 4 genera are given. Information is provided on the nomenclature of species, ecology, and their distribution across floristic regions. Some species are provided with notes that provide additional information about the taxonomic status of the species and infraspecific taxa. In the study area, the growth of rare and endangered plant species included in the Red Book of Kazakhstan was established: *Adonis vernalis* L., *A. wolgensis* Steven., *Pulsatilla flavescens* (Zucc.) Juz. (= *P. uralensis* (Zämels) Tzvel.).

Key words: flora, *Ranunculaceae* family, Tobol-Ishim and Turgai floristic regions, the Red Book of Kazakhstan.

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Қазақстанның Тобыл-Есіл және Торғай флористикалық аудандарының *Ranunculaceae* тұқымдасының түрлік құрамы

Жұмыстың мақсаты – Қазақстанның Тобыл-Есіл және Торғай флористикалық аудандарының *Ranunculaceae* тұқымдасының таксономиялық әртүрлілік деңгейін бағалау. Жұмыс дәстүрлі маршруттық-барлау әдісімен жүргізілген далалық зерттеулердің (2018–2023) нәтижелеріне негізделген. Келесі мекемелерде *Ranunculaceae* тұқымдасы бойынша сақталған материалдар сыни тұрғыдан зерттелді: Ботаника және фитоинтродукция институтының гербарийі, Алматы қ. (AA), У. Сұлтанғазин ат. педагогикалық институттың гербарийі, Қостанай қ. (KSPI); ММУ, Мәскеу қ. (MW); В.Л. Комаров ат. Ботаникалық институттың жоғары өсімдіктер гербарийі (LE); Өсімдіктер мен жануарлар экологиясы институтының гербарийі, Екатеринбург қ. (SVER).

Зерттеу нәтижесінде *Ranunculaceae* тұқымдасына жататын өсімдіктердің конспектісі жасалды және белгілі бір аумақтағы түрлердің нақты орналасуы туралы мәліметтер құрастырылды. Тобыл-Есіл флористикалық аймағы үшін барлығы 14 тұқымдастың 37 түрі берілген. Торғай флористикалық аймағы үшін 4 тұқымдастың 10 түрі берілген. Түрлердің номенклатурасы, экологиясы және флористикалық аймақтар бойынша таралуы туралы ақпарат берілген. Кейбір түрлер түрдің таксономиялық жағдайы, түршілік таксондар туралы қосымша ақпарат беретін жазбалармен жабдықталған. Зерттелетін аумақта Қазақстанның Қызыл кітабына енгізілген сирек кездесетін және құрып кету қаупі төнген өсімдік түрлерінің өсуі анықталды: *Adonis vernalis* L., *A. wolgensis* Steven., *Pulsatilla flavescens* (Zucc.) Juz. (= *P. uralensis* (Zämels) Tzvel.).

Түйін сөздер: флора, *Ranunculaceae* тұқымдасы, Тобыл-Есіл және Торғай флористикалық аймақтары, Қазақстанның Қызыл кітабы.

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Видовой состав семейства *Ranunculaceae* Тобол-Ишимского и Тургайского флористических районов Казахстана

Цель работы – оценка уровня таксономического разнообразия семейства *Ranunculaceae* Тобол – Ишимского и Тургайского флористических районов Казахстана. Работа основана на результатах полевых исследований (2018–2023 гг.), которые проводились традиционным маршрутно-рекогносцировочным методом. Критически исследованы материалы по данному семейству, хранящиеся в учреждениях: Гербарий института ботаники и фитоинтродукции, г. Алматы (AA), Гербарий педагогического института им. У. Султангазина, Костанай (KSPI); МГУ, г. Москва (MW); Гербарий высших растений Ботанического института им. В. Л. Комарова (LE); Гербарий института экологии растений и животных, г. Екатеринбург (SVER).

В результате исследований составлен конспект растений семейства *Ranunculaceae*, приведены сведения о конкретных местонахождениях видов на данной территории. Всего для Тобол-Ишимского флористического района приводится 37 видов из 14 родов. Для Тургайского флористического района приводится 10 видов из 4 родов. Приведены сведения о номенклатуре видов, экологии, распространении их по флористическим районам. Некоторые виды снабжены примечаниями, в которых приводятся дополнительные сведения о таксономическом статусе вида, внутривидовых таксонах. На исследуемой территории установлено произрастание редких и исчезающих видов растений, внесенных в Красную книгу Казахстана: *Adonis vernalis* L., *A. wolgensis* Steven., *Pulsatilla flavescens* (Zucc.) Juz. (= *P. uralensis* (Zämel) Tzvel.).

Ключевые слова: флора, семейство *Ranunculaceae*, Тобол-Ишимский и Тургайский флористические районы, Красная книга Казахстана.

Introduction

Plant biodiversity, as the foundation of the biosphere, plays a critical role in maintaining ecosystem functioning, ensuring food security, and sustainable human development. However, plant biodiversity is now under unprecedented threat from anthropogenic transformations, including climate change, habitat degradation, invasive species, and overexploitation of natural resources [1-5].

The Strategic Plan for the Convention on Biological Diversity calls for “the global community to strive to ensure by 2050 the conservation, restoration and sustainable use of biodiversity...” [6].

In Kazakhstan, biodiversity conservation is recognized as a priority task in the Concept for the Conservation and Sustainable Use of Biological Diversity of the Republic of Kazakhstan until 2030 [7].

Within the framework of the Sixth National Report of the Republic of Kazakhstan on Biodiversity, tasks for 2021-2030 were identified. Among the important tasks are the following: conducting local, regional and republican-level floristic studies aimed at replenishing and updating data on the diversity of plant communities in the territory of the republic [8].

The relevance of floristic research in the Tobol-Ishim and Turgai floristic districts is dictated by the need for a clear understanding of the current state and composition of the flora, which has been subjected to significant anthropogenic pressure for a long period of time [9-11].

Materials and methods

Botanical research was conducted using the route-reconnaissance method in 2018-2023. In the course of compiling a synopsis of plants of the *Ranunculaceae* family, the herbarium materials of the following institutions were used in full: the Department of Biology, Ecology and Chemistry of Ahmet Baitursynuly Kostanay Regional University (TOBYLKZ) and KuzBS (KUZ), as well as data from the herbarium collections of various scientific and educational institutions of Kazakhstan and Russia (AA – Institute of Botany and Phytointroduction, Almaty; KSPI – U. Sultangazin Pedagogical Institute, Kostanay; MW – Moscow State University, Moscow; LE – Komarov Botanical Institute, St. Petersburg; SVER – Institute of Plant and Animal Ecology, Yekaterinburg).

The authors considered the main publications on the studied territory: “Flora of Kazakhstan” (1956-1966), the “Central Asia Plant Identifier” (1968-

1993), “Flora of Western Siberia” (1927-1964), and “Flora of the USSR” (1934-1964). Available publications on floristic findings in the studied territory were analyzed [12-27].

Latin names of genera and species are given according to S.A. Abdulina [28], taking into account modern data.

For species, the nomenclatural citation includes links to the original description, as well as sources from “Flora of Kazakhstan”, “Flora of Western Siberia”, and “Flora of the USSR”. If a species is not listed in the above-mentioned references or has a different modern name, a link to other sources is provided.

For species included in the Red Book of Kazakhstan [29], the rarity category status is indicated.

Results and discussion

A comprehensive survey of *Ranunculaceae* plants in the Tobol-Ishim and Turgai floristic regions of Kazakhstan has been compiled. This work is based on extensive field research, meticulous analysis of herbarium specimens from various institutions (AA; KSPI; MW; LE; SVER), and a thorough review of relevant literature. The synopsis encompasses 39 species belonging to 14 genera.

Order RANUNCULALES

Family Ranunculaceae Juss.

Adonis parviflorus Fisch. 1824, in DC., Prodr. 1: 24; Gamayunova, 1961, Flora of Kazakhstan 6: 130; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 230.

Clayey-gravel slopes, margins of springs.

Turgai: Zhabaylinskiy and Amangeldynskiy districts, Uly-Zhylanshyk [30]; Prov. Turgai, Syr-Darja, Bertogur, the shady slopes of the mountains, 02 V 1910, N. Androsov (LE); Turgai region and district, Bel-Kuduk gully, clayey slope, 15 V 1913, M. Spiridonov.

Adonis vernalis L. 1753, Sp. pl.: 547; Gamayunova, 1961, Flora of Kazakhstan 4: 129.

Steppes, edges of steppe forest islands.

Tobol-Ishim: Kostanay Region, Karasu District, Village of Lenino, 24 VI 1992, N.A. Tsibanova (SVER); vicinity of Petropavlovsk city, “Meshchansky Forest”, anthropogenically disturbed birch forest, N54.92959°, E69.13773°, 153 m.a.s.l. (TOBYLKZ); Vicinity of Petropavlovsk, Tselinny Krai, suburban coniferous-deciduous park near Lake “Pestroe”, birch forest, 08 VI 1963, K.G. Maljutin (MW); Petropavlovsk District, [12]; Northern Kazakhstan Region, vicinity of

Leninskoye village, 50 km along the Petropavlovsk-Kokshetau highway, birch-aspens forest, edge of the forest, N 54.68241°, E 69.14474°, 144 m.a.s.l., 01 VI 2018, G.Zh. Sultangazina, A.N. Kuprijanov (TOBYLKZ); North Kazakhstan region, northeast, from the village of Krasnoyarka, forest, 24 VI 1972 (M. Kozybayev NKU); in the same location: 5 km northeast, Krasnoyarka village, forest, 25 VI 1976 (M. Kozybayev NKU); North Kazakhstan Region, Borki village, forest (M. Kozybayev NKU); North Kazakhstan region, 7 km NW of Sergeevka village, N 54.71898°, E 69.80614°, glacio-lacustrine alluvial plain, G.Zh. Sultangazina, A.N. Kuprijanov (TOBYLKZ).

Plant listed in the Red Book of Kazakhstan: category II, rare species [29].

Adonis wolgensis Steven. 1818, in DC Syst. I: 245; Gamayunova, 1961, Flora of Kazakhstan 4: 130; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 229.

Forest edges, in the shrubbery, meadow steppes.

Tobol-Ishim: Arakaragai Forest Enterprise, Krasnokordonskoye Forestry, sector 26, Early-Grass Pine Forest [15]; Arakaragayskoye Forestry, clearing in a pine forest, 05 May 2023, G. Sultangazina (TOBYLKZ); Baikadamovsky forestry, vicinity of the tract “Krivulya”, steppe, N 53.35, E 61.40, 204 m.a.s.l., 09 V 2018 (TOBYLKZ); Bor Tersek, Nauryzumskoe forestry, sector 127, ancient dune relief near Lake M. Aksuat, sandy-sod pine forest [15]; in the same place: in a birch grove in the northern part of the forest, 27 V 1936, N. Bolkhvitina (MW); In the shrublands along the floodplains of the Tobol River near the city of Kustanay 20 V 1921, P.P. Korenev (MW); Karabalysky District, vicinity of Mikhailovka village, Baikadamovski forestry, forest edge; in the same place: steppe along the bank of the Toguzak River; in the same place: Baikadamovski forestry, sector 13, birch forest, 26 V 2023, G.Sultangazina (TOBYLKZ); Kostanay region, “Kamennoe Ozero” Tract, birch forest on a steep slope, N53.28597°, W63.77815°, h=141 m.a.s.l. G.Zh. Sultangazina, A.N. Kuprijanov (TOBYLKZ); Aragaragay forest in a meadow near Sredny Kordon, 28 IV 1921, N.V. Pavlov (MW); Meadow steppe along the Tobol River near the stud farm, 27 IV 1921, N.V. Pavlov (MW); vicinity of the village Krasnye Borki, forest edge, 03 V 22 (TOBYLKZ); Surroundings of Shcherbakovo village, Ubaganskoye forestry, forest edge, 200 meters from the Shcherbakovo-Sosnovy Bor highway, N53.20445°, E64.21552°, 165 m.a.s.l., 30 VI 2018, G.Zh. Sultangazina, A.N. Kuprijanov (TOBYLKZ); near Lake Katantal, birch

grove, 19 V 1936, A. Voronov (MW); Uzunkol District, vicinity of Karl-Marx village, birch forest, G.Zh. Sultangazina, (TOBYLKZ); Petropavlovsk district [12]; Auliekol District, Basamansky Forestry, clearing in a pine forest, 23 IV 2020 [24]; Surroundings of the village Zhilgorodok, Amankaragayskoye forestry, sector 121, edge of the birch forest 25 IV 2020; in the same location, sector 36, clearing in a pine-birch forest, 16 IV 2020 [24]; Ubagansky Forestry, sector 143, sparse pine plantation, 26 IV 2020 [24]; Kaliningradskoe forestry, sector 92, a depression in a pine forest overgrown with birches, 22 IV 2020 [24]; Novonezhin Forestry, sector 149, a thicket-covered clearing in a pine forest, 18 IV 2020 (TOBYLKZ).

Plant listed in the Red Book of Kazakhstan: status. III, declining species [29].

Anemone sylvestris L. 1753, Sp. pl.: 540; Gamayunova, 1961, Flora of Kazakhstan 4: 64; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 192.

Sparse deciduous and coniferous forests, clearings, meadows.

Tobol-Ishim: Petropavlovsk, Tselinny Krai, Borki village, suburban coniferous-broadleaf park near Lake Pestroye, meadows with diverse herbaceous plants, 06 VI 1963, K.G. Malyutin (MW); Arakaragai Forestry Enterprise, Krasnokordonskoye Forestry, sector 23, 52,93, early fescue-ground lichen pine forest [15]; sectors 117,118,167, cherry birch forest [19]; near the Burli village, within the floodplain of the Toguzak river, in an alder grove of the “Krivulya” tract, 16 VI 1968 [13]; Tersek Forest, Sosnovskoye Forestry, sector 9, birch-pine forest with diverse herbs and ground cover [19]; A meadow on the southwestern slope of the Ayak-Blak stream valley, 20 km east of the village of Aksuat 14 VI 1936. A. Voronov (MW); Karabalyk State Seed Station near the Toguzak River, in the hollows of steppe watersheds, on solonchic meadows, 30 VII 1945, P. Serdyukov (MW); Karabalyksky District, vicinity of Mikhailovka village, Baikadamovskoye forestry, sector 13, sparse pine forest, 26 VI 2023 (TOBYLKZ); Kostanay district, “Kamennoe Ozero” private hunting ground, ostrich birch grove [19]; AraKaragay forest along the edge of birch groves, 14 V 1921, N.V. Pavlov (MW); between Amangaray and Semiozernoye, birch grove, 08 VI 1960, V. Tihomirov (MW); Nauryzum Forestry, sector 79, birch-pine forest with diverse herbaceous cover and ground mosses [19]; Presnogorkovskiy Forestry Enterprise, Borkovskiy Forestry, sector 12, pear birch forest [19]; Shcherbakovo village, mowed meadow 5 km southwest of the village of Karashok, 05 VIII

1956, L. Tyukanova (MW); Semiozerny Forestry Enterprise, Kalininsky Forestry District, sector 111, birch forest [19]; Taranovskiy Forestry Enterprise, Ordzhonikidzevskiy Forestry, compartment 43, birch-berry pine forest with diverse herbs [15].

Caltha palustris L. 1753, Sp. Pl.: 558; Gamayunova, 1961, Flora of Kazakhstan 4: 13.

Wetland shrub thickets, riverbanks and streams, damp meadows.

Tobol-Ishim: Petropavlovsk, Lake Pestroe, a small swamp near the lake, in a damp place, 19 VI 1963, E.T. Tropnikova (MW); Petropavlovsk, Lake “Pestroye”, along marshy areas along the shore, 20 V 1963, K.G. Malyutin (MW); near the village of Burli, in the floodplain of the Toguzak River, within the alder grove of the “Krivulya” tract, 16 VI 1968 [13]; Along the shore of the estuary in the floodplain of the Tobol River, near the city of Kustanay, 11 V 1921, N.V. Pavlov (MW); Semiozerny Forestry Enterprise, Kalininskoye Forestry, quarters 110 and 121, birch pine forest with horsetail and bramble undergrowth [15].

Ceratocephala falcata (L.) Pers. 1805, Syn.: 341; Gamayunova, 1961, Flora of Kazakhstan 4: 76; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 199.

Tobol-Ishim: to the south of the village of Uzunkol, behind the apple orchards, an artificial dam along the bank, 07 V 2012, K. Dobrohotova (AA).

Ceratocephalus testiculatus (Crantz) Roth, 1822, Enum. Pl.: Lhyn.: 70; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 198. – *C. orthoceras* DC. 1818, Syst. Nat., 1: 231; Gamayunova, 1961, Flora of Kazakhstan 4: 75.

Salt-affected soils with a high concentration of sodium ions, soils with a high concentration of soluble salts at or near the surface.

Tobol-Ishim: near Kostanay city, 200 meters from the Kostanay State University Agricultural Research Station, 01 VII 1997, Yu.V. Perezhugin, M.S. Knyazev (SVER); along the salt-marsh beyond the Middle Cordon in the Ara-Karagay forest on an open steppe meadow, 08 V 1921, N.V. Pavlov (MW); [Nauryzum Pine Forest], to the south of the village of Aksuat, steppe in plateau conditions, 18 V 1936, A. Voronov (MW); Aksuat village, sandy soil in the park, 6 V 1945, A. Voronov (MW); weeds in the garden [14].

Turgai: Zhabayev and Amangeldy districts, Uly-Zhylyanshyk [30]; Egentybulak, near the stream, 4 V 1935, C. Levitskiy (MW); [Aktobe Province, Irgiz District], Turgai Oblast, near Lake Maly Dzhalanach, sandy soil, meadow, 09 V 1898, I. M

Kryukov (MW, W0830973); *Artemisia* steppe on light loamy soil, 02 V 1898, I. M Kryukov (MW, W0830974).

Clematis orientalis L. 1753, Sp. Pl.: 543; Gamayunova, 1961, Flora of Kazakhstan 4: 72; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 197.

Saline meadows, river bluffs.

Tobol-Ishim: [Nauryzum Pine Forest], in a meadow along the bank of the sorrel, in the thickets of shrubs [14]; birch forest on the southern shore of Lake Kzyl-Shorka, 18 VII 1936, N. Bolhovitina (MW); Naurzumskoe Forestry, sector 92, birch-pine forest with diverse herbaceous and ground lichen cover [15].

Consolida orientalis (J.Gay) Schroding. 1909 in: Abh. Zool.-Bot. Ges. Wien 4, 5: 62. – *Delphinium hispanicum* Costa.

Cultivated as an ornamental.

Tobol-Ishim: Kustanai, vegetable garden, 30 V 1979, M.S. Knyazev (SVER).

Consolida regalis S.F. Gray 1921, Nat. Arr. Brit. Pl. 2: 711; Tsvelev, 2001, Flora of Eastern Europe 10: 76. – *Delphinium consolida* L. 1753, Sp. Pl.: 530; Gamayunova, 1961, Flora of Kazakhstan 4: 34; Пяхомова, 1972, Central Asia Plant Identifier 3: 164.

Growing as a weed in crops, along roadsides, mainly on sandy soils.

Tobol-Ishim: Petropavlovsk District [12]; Petropavlovsk, Tsentralny Krai, village of Borki, suburban coniferous-deciduous park near Lake “Pestroe”, in crops, on steam fields, 12 VIII 1963, K.G. Malyutin (MW); [Kostanay region], Kostanay district, dumps [20]; vicinity of Kostanay city, field, 20 VI 1983, S. Drobysheva (SVER); Denisov district, field, 06 VII 1988, V. Samsonovich (SVER); Tobol, Altynsarin microdistrict, near the residential area, 02 VII 2023, G. Sultangazina, (TOBYLKZ); Denisovo district, rural area surrounding the village of Komarovka, 07 VII 2012 (TOBYLKZ).

Ficaria verna Huds. Fl. Angl. ed. I (1762) 214; Gamayunova, 1961, Flora of Kazakhstan 4: 78. Kovalevskaya, 1972, Central Asia Plant Identifier 3: 175.

Tobol-Ishim: Natural Monument “Kamennoye Ozero tract”, meadow-fescue and diverse-herb association, 24 IV 1997, Yu.V. Perezhogin, M.S. Knyazev (SVER); in the meadow marshes of the Tobol River [27].

Halerpestes salsuginosa (Pall. ex Georgi) Green, 1900 in Pittonia, 4: 208; Gamayunova, 1961, Flora of Kazakhstan 4: 77; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 200.

Saline meadows.

Tobol-Ishim: North Kazakhstan Oblast, Lake Maly Tarangul Basin, July, 1982 [18]; North Kazakhstan Province, basin of Lake Pestroe, July, 1984 [18].

Leptopyrum fumarioides (L.) Rechb. 1828, Consp.: 192; Gamayunova, 1961, Flora of Kazakhstan 4: 21.

Wastelands near houses.

Tobol-Ishim: Petropavlovsk district [12].

Myosurus minimus L. 1753, Sp. Pl.: 284; Gamayunova, 1961, Flora of Kazakhstan 4: 75; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 198.

Riparian zones, margins of springs.

Tobol-Ishim: Petropavlovsk, “Pestroye” Lake, thickets on swampy areas, a gradually rising slope, 08 VI 1963, K.G. Malyutin (MW); On the saline-rich shoreline of a lake in the Tobol River valley near the city of Kustanai, 23 V 1921, N.V. Pavlov (MW); Arakaragay forest on the periphery of a damp saline depression near the Middle Cordon, 14 V 1921, N.V. Pavlov (MW); [Nauryzum Pine Forest], A saline area near the Ayak-Blak stream, 20 kilometers east of the village of Aksuat, near Karasu Taldy-Muin-Sai, 7 VI 1937, A. Voronov (MW); Terseksky pine forest, ephemeral section under an old pine tree amidst a burnt area, grove, 24 VI 1940, A. Shreter (MW); [Nauryzum Pine Forest], on highly saline soils [14].

Turgai: Dzhangeldynsky and Amangeldynsky districts, Uly-Zhylanshyk River, [30];

Pulsatilla multifida (G. Printz.) Juz. 1937, Фл. СССР, 7: 296; Gamayunova, 1961, Flora of Kazakhstan 4: 67.

Pine forests, ravines, and steppe patches in meadows.

Tobol-Ishim: Amandykaragai Pine Forest, VI 1958, A.Voronkov (MW); pine forest with birch and sedge understory, Tersék tract, Sosnovskoye forestry, sector 5 [19]; 20 km east of Aksuat village, steppe on the plateau in the upper reaches of the Ayak-Blak stream, 12 VI 1936, A.Voronkov (MW); Kustanai, 10 IX 1920, N.V. Pavlov (MW); Petropavlovsk, Tselinny Krai, suburban coniferous-broadleaf park near Lake “Pyostroe”, on the sandy soil of pine forests and their outskirts, on steppe meadows., 06 VI 1963, K.G. Malyutin (MW); Petropavlovsk District [12]; Kamensk-Uralskoe Forestry, sector 81, ground-willow birch forest [19]; Ara-Karagay Forest near Sredny Kordon on an open meadow, 26 IV 1921, N.V. Pavlov (MW); in the same place: 08 V 1921, N.V. Pavlov (MW); on a sandy hillside along the Tobol River near a

horse breeding facility in the vicinity of Kostanay, 27 IV 1921, N.V. Pavlov (MW); Nauryzum Forest District, sector 62, summits and slopes of sand dunes near Lake Katantal, juniper-pine forest [15]; Novo-Nezhinskoye Forestry, sector 163, pine forest with diverse herbaceous and ground vegetation, and lichens [15]; Sandy steppe located 20 kilometers northwest of the nature reserve, 05 VIII 1946, N. Sivkova (MW); on the edges of pine forests, in meadows, and on outcrops with a gravelly surface, in the Tersek section [14]; Presnogorkovskiy Forestry Enterprise, Borkovskoye Forestry, sector 22, pine forest with ground-cover lichens and ferns [15]; same location: sector 28, short-legged Birch grove [19]; same location: sectors 22,32 lichen pine forest [15]; Semiozerny Forestry Enterprise, Kalininskoye Forestry, sectors 110, 111, Mixed Birch Forest; same location: sector 90, short-legged birch forest [19]; Sosnovskoye Forestry, Tersek pine forest, sectors 5, 8 sandy-gravel outcrops, juniper pine forest, Taranovskiy Forest Enterprise, Dzhetygarinskiy Forestry, sector 36, steppe-meadow birch forest with veiny grass [19]; Ubaganskiy Forestry District, sector 28, pine forest with forbs, ground cover, and feather grass [15]; Uzunkol Forestry Enterprise, Yershovskoye Forestry District, sector 81, early-sprouting birch forest [19]; a section of sandy steppe 2 km northwest of the reserve's manor house, 14 VI 1946, N. Sivkova (MW).

Note. *P. multifida* is considered a part of the *P. patens* (L.) Mill. s. l. complex. Intraspecific structure of *P. patens* is extremely complex. In one of the first monographic treatments, A. Zamels [31] considered this plant as an aggregate with numerous subspecies. S.V. Juzepchuk [32] noted that the typical appearance of this species is well-traced within Europe but becomes extremely polymorphic in the Urals and Siberia. The far from complete isolation of European and Asian species has led to the existence of numerous intermediate forms, sometimes making it impossible to distinguish them. L.I. Malyshev [33] believes that this species does not occur in the Asian part of Russia. *P. patens* (L.) Mill. s. l. is included in the Red Book of the Republic of Kazakhstan (2014: 43; category II), in our opinion, without sufficient grounds, since it does not occur in Kazakhstan, and *P. multifida* is extremely abundant in Northern and Central Kazakhstan [24].

Pulsatilla uralensis (Zamels) Tzvel. 2001. Flora of East Europe, 10: 92. – *P. patens* (L.) Mill. subsp. *uralensis* Zamels, 1926, Acta Horti Bot. Univ. Latv. 1: 93. – *P. patens* (L.) Mill. subsp. *flavescens* (Zucc.) Zam. 1926, Acta Hort. Bot. Univ. Latv. 1: 95; Krylov, 1931, Flora of Western Siberia

5: 1165. – *P. flavescens* (Zuccar.) Jus. 1937, Flora of the USSR, 7: 296, p.p. (excl. typo) non Boros, 1924; Gamayunova, 1961, Flora of Kazakhstan 4: 68.

Meadows and forest edges of deciduous and coniferous forests.

Tobol-Ishim: Natural Monument “Kamennoye Ozero tract”, 02 VI 2023, G. Sultangazina, A.Kuprijanov (TOBYLKZ); Karabalyksky district, vicinity of Mikhailovka village, Baikadamovskoe forestry, vicinity of the Krivuli tract, steppe, N 53.35, E 61.40, 204 m a.s.l. (TOBYLKZ); Presnogorkovskiy Forestry Enterprise, Borkovskiy Forestry, sectors 22, 23: bilberry pine forest; sector 19: diverse herbaceous pine forest; sectors 5, 12: wintergreen pine forest; sector 32: lichen pine forest [15]; sector 14, bracken fern thicket [19]; Mendekarinsky district, N 53°46'29.2404" E 64°13'10.758", 8 km from the village of Lesnoye, edge of a birch forest, 04 V 2021, G. Sultangazina (TOBYLKZ); Altynsarinский District, Arakaragayskoe Forestry, clearing in a pine forest, 05 V 2023, G. Sultangazina (TOBYLKZ); Naurzysky District, 10-15 km from the village of Karamendyy, flat steppe, near the Danabike River, 08 V 2017 (TOBYLKZ).

Примечание. *Pulsatilla flavescens* (Zucc.) Juz. was first described by J.G. Zuccarini in 1826 as *Anemone flavescens* Zuccar. from the vicinity of Omsk, Siberia. According to the protologue: “C rescit frequentissima in Sibiriae pratis arides circa Omsk”. In 1937, S.V. Yuzepchuk made a combination in the flora of the USSR and transferred *Anemone flavescens* to *Pulsatilla flavescens* (Zucc.) Juz., which turned out to be a later homonym [34]. According to the rules of botanical nomenclature, this name cannot be used. Therefore, N.N. Tsvelev [34] made a new combination *Pulsatilla uralensis* (Zamels) Tzvel. For *P. uralensis*, perianths are characteristic of a yellow color range and narrow wedge-shaped leaflets to the base, the petiole of the upper lobe is either very short or absent [24].

This plant is listed in the Red Book of Kazakhstan (2014): category III.

Ranunculus acris L. 1753, Sp. Pl.: 554; (“acer”); Gamayunova, 1961, Flora of Kazakhstan 4: 105; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 225.

Marshes, lakes, and spring fringes.

Tobol-Ishim: Arakaragai Forestry Enterprise, Krasnokordonskoye Forestry, sector 165, willow birch forest; Aueliekol district, shore of a salt lake [17]; pine forest Tersek, Sosnovskoye forestry, sector 5, reed-sedge birch forest [19]; Jetysu Forestry District, sector 36, steppe birch forest with ground and reed undergrowth [19]; Jangeldy district,

Torgay urban-type settlement, meadow, 20 VI 1971, Yu.V. Pereghozin, 2010 (KSPI); Kalininskoe Forestry, sector 90, short-footed birch forest [19]; Karabalyksky district, Kardalinskoe forestry, bolck 251, willow elm forest [19]; Karabalyk district, vicinity of Stantsionny settlement, meadow, 07 VII 2005, (KSPI); Naurzysky District, vicinity of the village of Damdy, meadow, 16 VI 1969 [21]; vicinity of the “Sosnovy Bor” tourist base, pine forest, 04 VI 1980, [21]; vicinity of Zhitikara city, meadow, 19 VI 1970 [21]; vicinity of Kostanay city, meadow, 20 VI 1985, Yu.V. Pereghozin, 2010 (KSPI); vicinity of Presnogorkovka village, forest meadow, 24 VI 1968 [21]; Presnogorkovskiy Forestry Enterprise, Borkovskiy Forest District, sector 120: willow birch forest; sector 14: bracken fern birch forest [19]; Taranovskiy Forestry Enterprise, Ordzhonikidzevskoye Forestry, sectors 43, 44, birch-berry pine forest with diverse herbs; Ubaganskoye Forestry, sector 3, alder forest with ground cover of mosses [19]; Uzunkol Forestry Enterprise, Yershovskoye Forestry District, sector 81, early birch-sedge forest.

Ranunculus aquatilis L. 1753. Sp. Pl.: 556. – *Batrachium aquatile* (L.) Dumort. 1827, Fl. Belg.: 127; Tsvelev, Grintal 2001, Flora of Eastern Europe, 10: 171. – *B. gilberti* V. Krecz. 1937, Flora of the USSR, 7: 345.

Tobol-Ishim: Petropavlovsk District [12]; Akmola Region, Petropavlovsk District, 18 versts (approximately 19.2 kilometers) from the settlement of Kyzyl-Kiyek, 25 VII 1913, V. Drobov (LE); Turgay Region, Kustanay District, vicinity of Mordvintsevo village, Toguzak River, 15 VI 1913, M. Korotkij, Z.Lebedeva (LE); Turgay Region, Turgay District, 1st-2nd Nauryz Volosts, valley of the Kaiyng River, 26 VI 1909, V. Savich (LE); near Kostanay city, in the valley of the Tobol river, 21 VI 1930, N. Pavlov (LE).

Turgai: Turgai region, Kalmak River, near the Kaymak Kurgan burial mound, a shallow stretch of water, 01 VI 1913, M. Spiridonov (LE); Turgai, Syr-Darja, headwaters of the Emba river 20 X 1910 N. Androsov (LE); Turgay river bank, 20 VI 1898, I. Kryukov (LE); Turgai region, Amangeldy district, vicinity of Amangeldy village, in the Turgai river, 04 IX 1956, A. Yunatov, L. Kuznetsov (LE).

Ranunculus auricomus L. 1753, Sp. pl.: 551; Gamayunova, 1961, Flora of Kazakhstan 4: 93.

Meadows, outskirts of springs, banks of streams.

Tobol-Ishim: Petropavlovsk District [12]; vicinity of Kostanay city, damp meadow, 27 V 1986, [21]; Settlement of urban type Mendykara, damp meadow, 27 V 2009 [21].

Ranunculus circinatus Sibth. 1794, Fl. Oxon.: 175; Pavlov, 1935. Flora of Central Kazakhstan. 2: 241. – *Batrachium circinatum* (Sibth.) Spach, 1839, Hist. Nat. Veg. (Phan.), 7 : 201. – *B. foeniculaceum* (Gilib.) V. Krecz.. 1937. Flora of the USSR 7: 338; Gamayunova, 1961, Flora of Kazakhstan 4: 64; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 192.

Low-flow water bodies, backwaters of steppe rivers.

Tobol-Ishim: Petropavlovsk District [12]; North Kazakhstan Oblast, Sergeevskoe Reservoir [18]; Aulyekol district, Ubagan river, in water [17].

Ranunculus divaricatus Schrank 1789, Baier. Fl. 2: 104; Shchegoleva, Kuprijanov, 2014, Herbarium Collection, Systematics Department, Tomsk University 110: 23. – *Batrachium divaricatum* (Schrank) Wimm. 1840, Fl. Schles: 9; Gamayunova, 1961, Фл. Kaz., 4: 82; Kovalevskaya, 1972, Central Asia Plant Identifier3: 202.

Low-flow water bodies, drying shores of lakes.

Tobol-Ishim: in the waters of a small lake in the valley of the Tobol River near the city of Kostanay, 30 VI 1921, N.V. Pavlov (MW); the right bank of the Turgay River, 50 versts upstream from the city of Turgai, 20 VI 1898, I. Kryukov (MW); lower end of the continuous reach of the Nauryzum-Karasu river, 30 VII 1936, A. Voronov (MW); in the same place: lower reaches, 25 VII 1936, A. Voronov (MW); in the same place: a continuous stretch of open water, 3 VIII 1936, A. Voronov (MW).

Ranunculus eradicatedus (Laest.) F. Johansen, 1934, Canad. Field – Nat., 48 : 127. – *R. aquatilis* var. *eradicatus* Laest.1839, Nova Acta Reg. Soc. Sci. Ups. 11 : 242. – *R. aquatilis* var. *panthotrix* Ledeb. 1841, Fl. Ross. 1 : 27, p.p. – *Batrachium eradicatedum* (Laest.) Fries, 1843, Bot. Notis. (Lund): 144; Gamayunova, 1961, Flora of Kazakhstan, 4 : 80; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 202.

In rivers, streams, near the shore and among reeds in running water.

Tobol-Ishim: Northern Kazakhstan region, Lake Bolshoy Tarangul, bay in the western part, 20 VII 1983, [18]; Karasuskiy District, wetlands of the Tyuntyugur-Zhanshura lakes system [22].

Ranunculus lingua L. 1753, Sp. pl.: 549; Gamayunova, 1961, Flora of Kazakhstan 4: 89; Kovalevskaya, 1972, Central Asia Plant Identifier3: 209.

Marshes, in the water of steppe rivers.

Tobol-Ishim: Natural Monument “Kamennoye Ozero Tract”, lakeside, 16 VII 1987 [21]; vicinity of village Shcherbakovo, northern shore of Lake

Masaty, damp sedge meadows between hummocks, 05 VIII 1956, I. Drobytnina (MW); in the water of a small lake near the village of Rybnoye at the northern edge of the Ara-Karagay forest, 23 VII 1921, P.P. Korenev (MW); Karasuskiy district, wetlands of the Tyuntyugur-Zhanshura lake system [22].

Turgai: Dzhangel'dinsky district, urban-type settlement Kokalat, Kabyrga river, river bank, 15.07.2009 [21].

Ranunculus natans C.A. Mey. 1830, in Ledeb., Fl. Alt. 2: 315; Gamayunova, 1961, Flora of Kazakhstan 4: 88; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 209.

Wetlands, water bodies.

Tobol-Ishim: in stagnant and slowly flowing waters of the old channels of the Tobol River and its tributaries [27]; Karasuskiy District, wetlands of the Tyuntyugur-Zhanshura lake system [22].

Ranunculus pedatus Waldst. & Kit. 1805 Pl. rar. Hung. II: 112; Gamayunova, 1961, Flora of Kazakhstan 4: 115.

Forest edges, under the canopy of steppe shrubs, along steppe depressions, in ravines.

Tobol-Ishim: vicinity of the village of Mendykar, grassland, 24 V 2009 [21]; vicinity of the village of Novonezhenka, grassland, 18 VI 1988 (KSPI); vicinity of Shcherbakovka village, along the road, 05 V 2023 (TOBYLKZ); vicinity of the tourist base "Lesnaya", meadow, 14 V 1991 (KSPI); Arakaragay forest along the shore of the estuary on raw saline soil, 08 V 1921, N.V. Pavlov (MW); 20 km east of the village of Aksuat, a small swamp on the western slope towards the Ayak-Blak stream, 13 VI 1936, A. Voronov (MW); Naurzum State Nature Reserve, 13 V 1935, N. Emagombetov (MW); Naurzum State Nature Reserve, on the complex saline steppe along the shore of Lake Chulak-Kamysh, 28 V 1936, N. Bolhovitina (MW); Naurzum State Nature Reserve, grassland, 14 VI 1993 (KSPI); Vicinity of Kachar village, slightly saline meadow with patches of salt marsh, edge of natural birch stands, 18 V 2022, Ye. Simanchuk, A. Kuprijanov, G. Sultangazina, (TOBYLKZ); tailings dumps, areas covered with steppe vegetation; in the valley of the Tobol River near the city of Kostanay, 10 V 1921, N.V. Pavlov (MW); vicinity of Kostanay city, meadow, 12 V 1989 Yu.V. Perezhogin, 2010 (KSPI); Aysary village (Glazunovka), along the roadside, 08 V 2017 (TOBYLKZ); Taranovsky District, near the village of Pavlovka, virgin steppe plots, 03 VI 1958, A. Voronov (MW).

Turgai: Dzhangel'dinsky district, urban-type settlement Kokalat, meadow, 05 V 2009 (KSPI).

Note. Yu.V. Perezhogin cites *R. pedatus* var. *silvisteppaceus* (Dubovik) Luferov for the city of Kostanay.

Ranunculus platyspermus Fisch. ex DC. 1824, Prodr. 1: 37; Gamayunova, 1961, Flora of Kazakhstan 4: 118; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 221.

Saline meadows near streams, under steppe shrubs.

Turgai: Dzhangel'dinsky district, urban-type settlement Torgay, desertified steppe, 03 V 2009 [21]; Dzhangel'dinsky district, the sands of Tosynkum, desertified steppe, 02 V 2013 [23]; [Aktobe region, Irgiz district], Turgai oblast, near lake Maly Dzhalangach, in the steppe near lake Maly Dzhalangach, 11 V 1898, I. M. Kryukov (MW, W0831293); in the same place: sandy soil in meadows, 12 V 1898. I. M. Kryukov (MW, W0831294).

Ranunculus polyanthemus L. 1753, Sp. pl.: 554; Gamayunova, 1961, Flora of Kazakhstan 4: 104; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 215.

Meadows, forest glades, and spring edges.

Tobol-Ishim: Aman-Karagai, in a birch grove, 30 VII 1898, I. Kryukov (MW); Aueliekol District, along the Amangeldy Highway 15 km before the turn to the village of Karamendy, meadow, 24 V 2009 [21]; 20 km east of the settlement (pos.) of Aksuat, birch forest on Aiyak-Blake, 08 VIII 1945, A. Voronov (MW); 8 km southeast of Aksuat village, 14 VI 1946, A. Voronov (MW); in the same place: at Ayak-Blak creek (headwaters of the Taldy-Muyn-Say river), 11 VI 1936, A. Voronov (MW); Kostanay, vicinity of the Agricultural institute 01 VI 2022 (TOBYLKZ); Petropavlovsk, "Pestroye" Lake, in the swamp, 08 VI 1963, K.G. Malyutin (MW); Zhetiqara district, Shevchenkova urban-type settlement, meadow, 15 VII 2006 (KSPI); Semiozerny Forestry Enterprise, Kalininsky Forestry, sectors 101, 121: birch-pine forest with horsetail and stoneberry; sector 111: Birch grove with herbs of the Apiaceae family; Karabalyksky District, Mikhailovsky Forestry, meadow, 11 VII 1967 (KSPI); Karabalyksky District, natural monument "Verensky Borok", right bank of the Toguzak River, 26 V 2023 (TOBYLKZ); Karabalyksky district, along depressions and forest patches, 29 VII 1945, I. Serebryakov (MW); In the inter-tussock water of the estuary in the valley of the Tobol River 5 km above the city of Kostanay, N.V. Pavlov (MW); Semiozerny Forestry Enterprise, Novonezhinskoye Forestry, sector 163, pine forest with diverse herbaceous and ground-based lichens [15]; vicinity of the village of Shcherbakovo,

meadow, 03 VII 1970, (KSPI); Natural Monument “Kamennoye Ozero Tract”, floodplain meadow, 07 VI 2022 (TOBYLKZ); across the damp meadow in the Ara-Karagay forest between the village of Rybny and Sredny Kordon, 28 V 1921, N.V. Pavlov (MW); Shcherbakovo village, shrub steppe on the edge of a birch grove 2 km to the west of Koblandy village, 04 VIII 1956, N.N. Kaden (MW); Taranovsky Forestry Enterprise, Ordzhonikidzevskoye Forestry, sector 44, birch-pine forest with stoneberries and various herbs [15]; aranovsky district, urban-type settlement Asenkritovka, meadow, 31 V 2009 [21]; Fedorovo district, vicinity of Bannovka village, lagoon between fields, 14 VI 2023 (TOBYLKZ); on the shore of Lake Katantal, a clearing among birch trees, 01 VI 1935, S. Levitskiy (MW); Arakaragai Forestry, Ubagan Forestry, sector 28; Krasnokordon Forestry District, sector 10, mixed pine forest with ground bromegrass [15]; Uzunkolsky district, Presnogorkovskiy Forestry Enterprise, Borkovskiy Forestry, sector 28, early aspen forest [19].

Ranunculus polyphyllus Waldst. et Kit. ex Willd. 1799, Sp. Pl. 2, 2: 1331; Gamayunova, 1961, Flora of Kazakhstan 4: 89.

In the water of freshwater and saline drying lakes.

Tobol-Ishim: North Kazakhstan region, temporary watercourse along the periphery of Black Marsh, 13.07.1991 [18]; amongst the hillocks in the water of the estuary in the valley of the Tobol River, 5 km upstream from the city of Kostanay, N.V. Pavlov (MW); Karasuysky District, wetlands of the Tyuntyugur-Zhanshura lake system [22]; vicinity of the “Sosnovy Bor” sanatorium, meadow, 16 VI 2009 [21]; in the sandy steppe amidst shrubs [14]; 8 km to the south-southeast of the settlement of Aksuat, Shegenbay Lake, 14 VI 1946, A. Voronov (MW).

Ranunculus polyrhizos Steph. ex Willd. 1799, Sp. pl. 2, 2: 1331; Gamayunova, 1961, Flora of Kazakhstan 4: 96; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 211.

Steppes, slopes of hillocks and low mountains, thickets of steppe shrubs.

Tobol-Ishim: Vicinity of Kostanay city, Diesel plant district, mixed-grass and cereal steppe, 18 V 1978 (KSPI); alleys of the Karasu River, lake basins, on wet meadows [14]; in the steppe near Kostanay, 29 IV 1921, S.N. Kulikova (MW); in the same place: 27 IV 1921, N.V. Pavlov (MW); near the village of Aksuat, sandy steppe, 18 IV 1934, S. Levitskiy (MW); in the same place: gradual steppe western slope towards Lake Aksuat, 18 V 1936, A. Voronov (MW); Vicinity of the Kamensk-Uralsky settlement, steppe, 27 IV 2009 [21]; Denisovsky

District, vicinity of the village of Arshaly, steppe, 30 IV 2009 [21]; Zhetikara district, Zhelkvar river, river bank, 01 V 2009 [21]; natural monument “Verensky Borok”, steppe, 01 V 2009 [21]; Taranovsky District, vicinity of Asenkritovka village, steppe, 01 V 2009 [21]; Aragaragay forest near Sredny Kordon in a highly saline steppe, 26 IV 1921, N.V. Pavlov (MW).

Turgai: Angarskoye village, 17 km from the town of Arkalik, rocky slope 200 m from the Angarskoye-Ashutashty highway, dry clay steppe, 20 IV 2017 G.Zh. Sultangazina (TOBYLKZ); Dzhangeldinsky District, vicinity of the village of Akkum, deserted steppe, 01 V 2014 [23].

Ranunculus propinquus C.A. Mey. 1830, in Ledeb., Fl. Alt. 2: 332; Gamayunova, 1961, Flora of Kazakhstan 6: 106. – *R. borealis* Trautv. 1860, Bull. Soc. Nat. Moscou, 33, 1: 72, p. p.; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 215.

Wetlands, springs, and shrub thickets.

Tobol-Ishim: Mendykarinsky District, Kamensk-Uralskoye Forestry, sectors 81, 115, 128, bracken pine forest; sector 59, stoneberry pine forest [15].

Ranunculus repens L. 1753, Sp. Pl.: 554; Gamayunova, 1961, Flora of Kazakhstan 4: 104; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 214.

Riparian zones and moist meadows.

Tobol-Ishim: Petropavlovsk, Tselinny Krai, Borki village, suburban coniferous-broadleaf park near Lake “Pestroye”, 20 VI 1963, K.T. Malyutin (MW); Natural Monument “Kamennoye Ozero Tract”, northern slope of a lake basin, 2018 G. Sultangazina, A. Kuprijanov (TOBYLKZ); Ara-Karagai forest along the wet estuaries near Sredny Kordon, 27 V 1921, P.P. Korenev (MW); Tobol river valley near Kostanay, in damp areas, 30 V 1921, N.V. Pavlov (MW); east shore of Lake Kayran-Kul, wet sand near the water, 11 VI 1935, A. Demidova (MW); 20 kilometers east of the settlement of Aksuat, near the Taldy-muyn-say river, 13 VI 1936, A. Voronov (MW); vicinity of the village of Kamensk-Uralsky, littoral zone of the lake, 17 V 1976 (KSPI); vicinity of the village of Peshkovka, a damp meadow, 21 VIII 1978 (KSPI); lake Kushmurun, moist meadow, 16 VI 1982 (KSPI); vicinity of Shcherbakovo village, damp meadow, 14 VI 1985 (KSPI); vicinity of the village of Taranovskoye, a damp meadow, 22 VI 1988 (KSPI); Federovsky District, vicinity of the village of Bannovka, a lagoon between fields, 14 VI 2023 (TOBYLKZ); Tobol, Altynsarin microdistrict, lake vicinity, 04 VI 2022 G.Zh. Sultangazina (TOBYLKZ); Karabalyksky district, Mikhailovka

village, bank of the Torguzak river, 26 V 2023 (TOBYLKZ).

Ranunculus rionii Lagger 1848, in Flora (Regensb.) 31: 49; Shchegoleva, Kuprijanov, 2014. Herbarium Collection, Systematics Department, Tomsk University 110: 23. – *Batrachium rionii* (Lagg.) Nyman 1852, Bot. Not. (Lund): 908; Gamayunova, 1961, Flora of Kazakhstan 6: 83; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 203.

In shallow, stagnant, and saline water bodies.

Tobol-Ishim: North Kazakhstan Region, temporary water body 1 km east of Lake Polovinnoe, 07.07.1985 [18]; along the muddy shore of a small lake near the Rybny Kordon in the Ara-Karagay forest, 23 VI 1921, S.N. Kulikova (MW); Turgai Region 1898, I. Kryukov (MW); Turgai region, Kustanai district, muddy shore of Rybny Kordon lake in the Ak-Karagai Forest, S. Pavlov, 23 VI 1923 (LE); Turgay region, Kustanay district, vicinity of Artabevskiy village, 02 VI 1913, M. Korotkiy and Z. Lebedeva (LE); Turgay region, Irgiz District, on the shore of the freshwater lake Zhumar-kol, 25 V 1914, M. Dessyatov (LE); Turgai Oblast, Kustanai District, vicinity of Nazarevskiy settlement, 03 VII 1913, M. Korotkiy and Z. Lebedeva (LE); Karasuysky District, wetlands of the Tyuntyugur-Zhanshura lake system [22].

Ranunculus sceleratus L. 1753, Sp. Pl.: 551; Gamayunova, 1961, Flora of Kazakhstan 4:102.

Moist meadows, riverbanks, lakeshores, and marshlands.

Tobol-Ishim: vicinity of Shcherbakovo village, Arakaragai forestry, glade swamp, sector 7, 21 VIII 1956, N. Bystrenko (MW); Natural Monument “Kamennoye Ozero Tract”, northern slope towards a lake basin; meadow-marsh communities on the shore, G. Sultangazina, A.Kuprijanov (TOBYLKZ); along the shore of a freshwater lake in the Kazanbasy Forest, 16 VII 1921, S.N. Kulikova (MW); an open area among the reeds near Lake Bainazar-Kopa, 24 VI 1936, A. Voronov (MW); Petropavlovsk, Pestroye Lake, along the damp shore, 08 VI 1963, K.G. Malyutin (MW); vicinity of Satay village, damp meadow, 25 VI 1974, Yu.V. Perezhogin, 2010 (KSPI); vicinity of the city of Zhetikara, the Shortandy River, in the water, 19 VII 2008 [21]; Mendykara, wet meadow, 24 VI 2009 (KSPI); Fedorovskiy district, urban-type settlement Korshikol, moist meadow, 10 VII 2009 [21], Kostanay, Tobol River bank, near summer cottages, by the spring, 02 VI 2022 G. Sultangazina (TOBYLKZ); along the muddy banks of small lakes

in the valley of the Tobol River near Kustanai, 03 VI 1921, N.V. Pavlov (MW).

Ranunculus subborealis Tzvel. 1994, Bull. of the Moscow Soc. of Naturalists, Dep. of Biology 99, 5: 70. – *R. borealis* Trautv. var. *typical* Trautv. 1860, Bull. Soc. Nat. Moscou, 33, 1: 73, nom. illegit. – *R. propinquus* subsp. *prorinquus* var. *borealis* (Trautv.) Luferov, 1992, Bull. of the Moscow Soc. of Naturalists, Dep. of Biology 97, 4: 99.

Shrub thickets in swampy areas.

Tobol-Ishim: Mendykarinsky District, Kamensk-Uralsky Forestry, sectors 59, 115, stoneberry pine forest [15].

Ranunculus trichophyllus Chaix 1786, in Vill., Hist. Pl. Dauph. 1: 335. – *Batrachium trichophyllum* (Chaix) Bosch, 1850, Prodr. Fl. Batav. 1: 7; Gamayunova, 1961, Flora of Kazakhstan 6: 82; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 202.

Valley and lowland lakes.

Tobol-Ishim: North Kazakhstan region, lake Kozlovskoye, 25 VIII 1984 [18]; Malyi Trangul lake, 21 VIII 1985 [18]; Fyodorovsky District, Lake Zharkul near the bank of the Syun-Karasu River, in the reeds in a damp place, 26 VI 1937, A. Voronov (MW).

Turgai: Dzhangeldinsky district, Sarykopa [30]; Turgai region, 14 V 1898, I. Kryukov (MW); Dzhangeldinsky and Amangeldy districts, Uly-Zhylanshyk [30]; Amangealdinsky District, wintering “Kushuuk”, Rodnik village, 8 km downstream of Rakhmest village, Uly-Zhilanchik River, 21 VII 1996 [16].

Thalictrum flavum L. 1753, Sp. Pl.: 546; Gamayunova, 1961, Flora of Kazakhstan 4: 126.

Shrub thickets, edges of groves, in meadows, riverbanks.

Tobol-Ishim: Altynsarinsky District, Shcherbakovo village, dried-up swamp with bushes, 2 km northeast of Lake Masaty, 05 VIII 1956, N. Semyonova (MW); bank of the Karasu River, [17] Aman-Karagay pine forest, 29 VII 1898, I. Kryukova (MW); in the birch grove, 10 VII 1898, I. Kryukov (MW), Naurzum, shrub thickets; edges of forests; in meadows [14].

Thalictrum minus L. 1753, Sp. Pl.: 546; Gamayunova, 1961, Flora of Kazakhstan 6: 124; Kovalevskaya, 1972, Central Asia Plant Identifier 3: 227.

Shrub thickets, meadows.

Tobol-Ishim: Petropavlovsk, Celinny Krai, suburban coniferous-broadleaf park near Lake “Pestroe”, birch forest, 14 VII 1963, K.G. Malyutin (MW); Presnogorkovskiy Forestry Enterprise,

Borkovsky Forestry District, sector 22, pine forest with ground reedgrass [15]; sector 9, birch grove with ground reedgrass; sector 14, birch grove with fern; sector 12, birch grove with *Pyrola* [19]; Karabalyk District, Mikhailovsky Forestry Enterprise, Sazymbaevskoe Forestry, sector 210: pine forest with reed-like fescue and miscellaneous herbs; Taranovsky Forestry, Ordzhonikidzevskoye Forestry, sector 43: birch-pine forest with honeysuckle and miscellaneous herbs; sector 44: birch-pine forest with honeysuckle and miscellaneous herbs [19]; Kostanay district, Natural Monument “Kamennoye Ozero Tract”, upland meadows with shrub thickets, 2018 (TOBYLKZ); Kostanay district, 16 VI 1902, A. Vatranbskyi (MW); in the thickets of the Tobol River valley near the city of Kostanay, 30 VI 1921, N.V. Pavlov (MW); [Kostanay Region, Taranovsky District] B. Mailin district, in the fields near the village of Nelubinsky, 21 VIII 1921, S.N. Kulikova (MW); Nauruzum District, Tersek Bor, northern edge of the pre-steppe forest, among birches, 24 VI 1940, A. Shreter (MW); near the Nauryzum-Karasu River, dry bottom of a small depression, 07 VII 1936, A. Voronov (MW); within a 2-15 kilometer radius to the west of Lake Karakul, encompassing the western portion, 10 VI 1935, A. Demidova (MW); on sandy soil, Nauryzum forest glade, 10 VII 1898, I. Kryukova (MW).

Turgai: [Dzhangeldinsky district], Kara-Kuga, along the bank of the Turgai River, 11 VIII 1929, V. Kuttyeva (MW).

Thalictrum simplex L. 1767, Mantissa, 1: 78; Gamayunova, 1961, Flora of Kazakhstan 4: 126.

Shrub thickets, meadows, and spring margins.

Tobol-Ishim: Mendykarsk district, Kamensk-Uralsk forestry, sector 115, mixed pine forest [15]; Presnogorkovskiy Forestry Enterprise, Borkovskiy Forestry District, sector 12, pine forest with bracken; sector 8, diverse grass pine forest [15]; sector 28: early meadow grass birch forest; sector 34: bracken fern birch forest with fern 34: bracken fern birch forest with fern; sector 14: birch forest with *Pyrola* [19]; Karabalyk district, Mikhailovsky Forestry Enterprise, Baikadimskoye Forestry, sector 318, early sedge pine forest; Sazymbaevskiy Forestry, sector 201, early sedge pine forest; Taranovsky Forestry Enterprise, Ordzhonikidzevskoye Forestry, sector 43, birch pine forest with stoneberry and mixed herbs [15]; sectors 36, 37 birch forest with stoneberry and mixed herbs [19]; Tobyl, Altynsarina microdistrict, old channel of the Tobol River, 05 VII 2022, G. Sultangazina (TOBYLKZ); Natural Monument “Kamennoye Ozero Tract”, meadow-steppe communities (TOBYLKZ); “4 km

east of the village of Zarechnoye, steppe, along a dirt road, 30 V 2012 (TOBYLKZ); Karabalyk State Breeding Station, in the depressions, 30 VII 1945, I. Serebryakov (MW); Karasusky District, wetlands of the Tyuntyugur-Zhanshura lake system [22]; Arakaragai Forest Enterprise, Krasnokordonskoye Forestry, sector 26: early-grass pine forest, Ubaganskoye Forestry, sectors 38, 51, 138: pine forest with cherry and spirea [15]; vicinity of Lesnoye village, Kalininskoye forestry, sector 110, forest groves of aspen and birch with common viburnum 06 VII 2023, G. Sultangazina, A. Kuprijanov (TOBYLKZ); sector 109, early-grass pine forest; Kazanbas Forest District, sector 104, pine forest with cherry and spirea; Novonezhinskoye Forestry, sector 163, mixed-grass pine forest with ground reedgrass [15]; Kalinin Forestry, sector 111, birch with *Piperia* [19]; Naurzumsky District, 8 km west of the village of Aksuat, edge of a meadow among willow and birch thickets near Lake Kutantal, 28 VII 1945, A. Voronov (MW); the edge of a birch grove, 16 VIII 1937, A. Voronov (MW); Bishagash, birch forest, 19 VIII 1934, S. Levitskyi (MW); Sarymuyn-sunkar Plateau, 16 VII 1936, S. Viktorov (MW); near the Taldy-Muin-Sai River, by the Orta-Blak stream, on the lower part of the western slope, 11 VII 1936, A. Vronov (MW).

Turgai: Dzhangeldinsky district, the Malyy Karuch River, in the Arshaly Mountains, 05 VII 1898, I. Kryukov (MW).

Trollius asiaticus L. 1753, Sp. Pl.: 557; Gamayunova, 1961, Flora of Kazakhstan 4: 15; Pahomova, 1972, Central Asia Plant Identifier 3: 144.

Meadows near birch forests.

Tobol-Ishim: birch forest on the right-bank river terrace of the Yesil river within the Kyzylzhar district of the North Kazakhstan region, 10 VI 07 [26].

According to the Flora of Kazakhstan [35], the following species were listed for the Tobol-Ishim floristic district (Tobol-Ishim) of the study area: *Aconitum volubile* Pall. ex Koelle (= *A. villosum* Reichenb.), *Chrysocyathus sibiricus* (Ledeb.) J. Holub (= *Adonis sibirica* Patr. ex Ledeb.), *Delphinium dictyocarpum* DC., *D. elatum* L., *Ranunculus gmelinii* DC., *Ranunculus monophyllus* Ovcz., *Ranunculus oxyspermus* Willd., *Ranunculus reptans* L. However, no herbarium material was found for these species. For the Turgai floristic district (Turgai), the following species were listed: *Buschia lateriflora* (DC.) Ovcz., *Clematis orientalis* L., *Ranunculus acris* L., *Ranunculus polyanthemus* L., *Ranunculus polyphyllus* Waldst.

et Kit. ex Willd., *Ranunculus repens* L., *Thalictrum flavum* L. However, no herbarium collections were found for these species either. Perezkhogin et al. [25] reported *A. villosa* from the Nauryzum State Reserve (steppe, 01. V 2010). The LE Herbarium contains one young specimen that we identified as *Adonis wolgensis*.

Perezkhogin et al. [25] report *Anemonoides ranunculoides* (L.) Holub, *Ranunculus pedatus* var. *silvestrepaceus* (Dubovik) Luferov (= *Ranunculus silvestrepaceus* Dubovik), and *Ranunculus flammula* L. for Kostanay region. However, we have not seen any reliable herbarium specimens of these species.

P.G. Pugachev [15] reported *Anemone nemorosa* L. for Uzunkolsky District of Kostanay Oblast (Presnogorkovskiy Forestry Enterprise, Borkovskiy

Forestry, sector 22, pine forest with stoneberry), but we did not find any reliable herbarium collections.

R.T. Nurmukhambetova [27] lists *Trollius altaicus* C. A. Mey. for Kostanay region – we have not seen any reliable collections of this species from this area.

Conclusion

A total of 37 species from 14 genera are listed for the Tobol-Ishim floristic district. For the Turgai floristic district, 10 species from 4 genera are listed.

The study area is home to three species of rare and endangered plants listed in the Red Book of Kazakhstan: *Adonis vernalis* L., *A. wolgensis* Steven., and *Pulsatilla flavescens* (Zucc.) Juz. (= *P. uralensis* (Zämels) Tzvel.).

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