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Research article

Checklist of aquatic alien species established in large river basins of Belarus

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Abstract

The assessment of risks associated with alien invasive organisms implies a detailed knowledge of their taxonomical composition and distribution within an assessment unit. In this paper we used both literature data and results from our field surveys of more than forty sites, conducted in 2006-2008, to compile a checklist of aquatic alien species (invertebrates and fish) established in the three large river basins of Belarus (Dnieper, Pripyat, Neman). Thirty six alien species have been revealed, most of which are of Ponto-Caspian origin. The discovery of several new species during our surveys indicates that the rate of introductions has substantially increased over the last two decades.

Key words: alien aquatic species, Belarus, exotic species, fish, invertebrates, rate of introduction

Introduction

Invasive alien species are a major ecological threat recognised all over the world. Many successful invaders have also imposed high economic damages (e.g., Pimentel et al. 2005). The estimation of the probability of establishment and the assessment of risks associated with alien species require a detailed knowledge of their diversity and distribution within an assessment unit (Semenchenko and Pugachevskiy 2006; Olenin et al. 2007; Panov et al. 2007; Arbačiauskas et al. 2008). The goal of this study was to review the species composition and distribution of aquatic alien animals established in the main river basins of the Republic of Belarus. Different pathways have been responsible for introduction of exotic species into the waterbodies of this country, with shipping through interbasin canals being identified as the most important one (Bij de Vaate et al. 2002; Karatayev et al. 2008). In their recent review paper, Karatayev et al. (2008) have composed the first checklist of aquatic alien invertebrates found in Belarus. Herein, we enlarge this inventory with new records made by us during surveys of the rivers Dnieper, Neman, Pripyat and the Dnieper-Bug Canal conducted in 2006-2008. In addition, we provide the first list of alien fishes established under natural conditions in the basins of these rivers.

Material and methods

This checklist of alien species was compiled using both data from the literature and our survey results from the rivers Dnieper, Neman, Pripyat, and the Dnieper-Bug Canal. Although more than 40 locations were sampled in these

basins during 2006-2008, in the present paper we focused on 15 sites that had been sampled with equal effort (Figure 1). The AQEM protocol was used for sampling the benthic macroinvertebrates at these sites (AQEM Consortium 2002). All benthic samples were collected in 4-5 replicates from 20-50 cm depth near the bank using a hand-net (ISO 7828) that had been dragged along a 5 m long transect. In the midstream part of the port bays of Mikashevichi (Pripyat River) and Brest (Mukhovets River), a set of benthic samples was taken using a Ponar Grab (10 x 15 cm). The fishes were caught with a hand-net (50x50 cm, mesh size 10 mm) from 0.5-1.0 m depth.

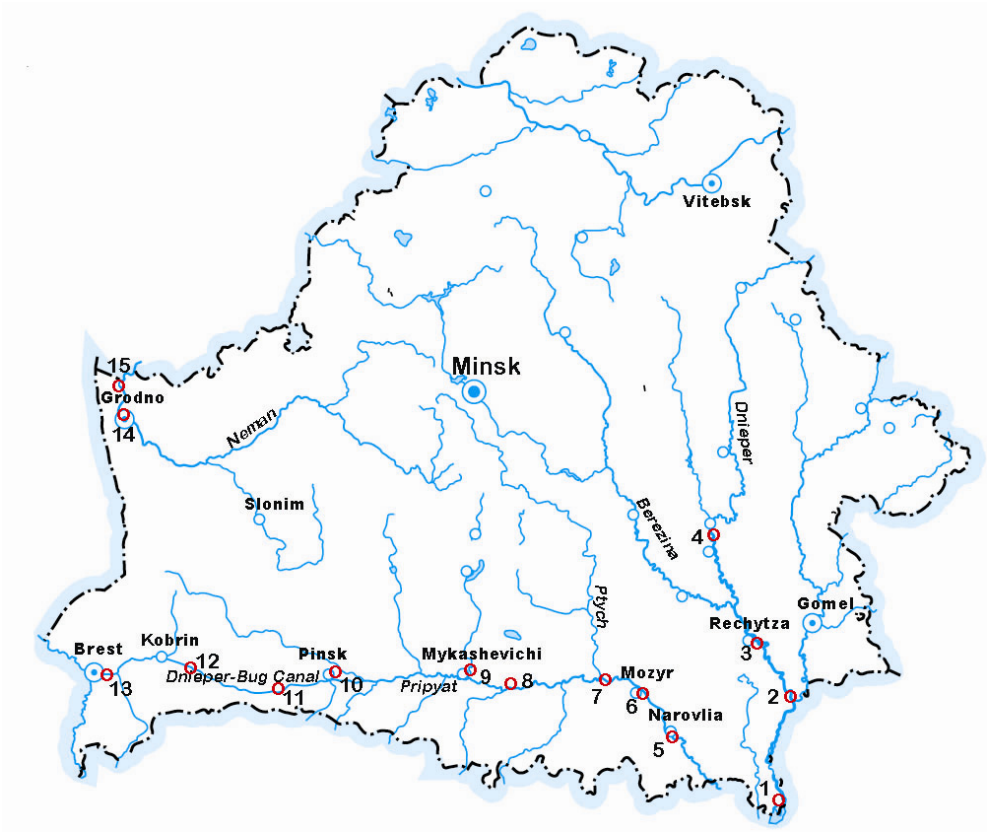

Figure 1. Location of sites sampled and discussed in this study (red circles)

Results and Discussion

Species composition, distribution and pathways of introduction

Thirty six alien species are currently known from the examined river basins. Almost all of them are of Ponto-Caspian origin (Annex 1). The number and distribution of exotics differs strikingly between the basins. The highest species richness occurred in the rivers Pripyat and Dnieper, indicating that these waterways play an important role as corridors for invasion of aquatic exotic animals on the territory of Belarus (Figure 2).

Within a basin, the highest number of alien species was usually observed in the lower reaches of the rivers and in the river ports. For instance, 19 species were recorded in the Dnieper River at the Belarus-Ukraine border (site 1, Figure 1), and 14 species in the Mikashevichi river port (Pripyat River, site 9, Figure 1). Only five species, i.e., *Chelicorophium curvispinum* (Sars, 1895), *Lithoglyphus naticoides* (C. Pfeiffer, 1828), *Dreissena polymorpha* (Pallas, 1771), *Percottus glenii* (Dybowsky, 1877) and *Carassius auratus gibelio* (Bloch, 1782), appeared to be common for all examined river basins.

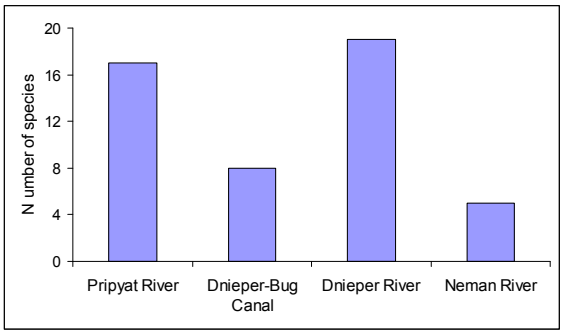

Figure 2. Number of alien species established in different river basins of Belarus

There are different levels of certainty as to how and when an alien species arrived in a river basin. For example, it is not known exactly when *Eurythemora velox* (Lilljeborg, 1853), *L. naticoides* and *C. curvispinum* appeared in the Pripyat River basin, or when *Neogobius gymnotrachelus* (Kessler, 1857) and *Neogobius melanostomus* (Pallas, 1814) arrived in the Dnieper River basin. However, based on the dates of first records or publications, all alien species from our checklist (Annex 1) could conventionally be divided into the following three groups: 'old invaders' (from the end of the 19th century to 1950), 'late invaders' (1950-1990) and 'new invaders' (after 1990).

The first group includes 9 species, i.e. *Potamothrix moldaviensis* (Vejdovsky and Mrazek, 1902), *Tubifex newaensis* (Michaelsen, 1903), *C. curvispinum*, *D. polymorpha*, *L. naticoides*, *P. pungitius pungitius* (Linnaeus, 1758), *Neogobius fluviatilis* (Pallas, 1814), *Amerius nebulosus* (Le Sueur, 1819) and *C. a. gibelio*. The introduction of most of them was related to the construction of shipping canals that established the hydrological connection between the Black Sea and Baltic Sea basins about 200 years ago (Olenin 2002; Karatayev et al. 2008). The main vector for introduction of invertebrates from this group was the firewood transported in rafts from the Russian Empire into Western Europe (Karatayev et al. 2008), while the fishes either naturally dispersed from the Ponto-Caspian region (*N. fluviatilis*) or were intentionally introduced by humans (*C. a. gibelio*, *A. nebulosus*). Although the most intensive ship traffic occurred in the Dnieper-Bug Canal, other artificial canals were also important for the spread of alien invertebrates. For example, it was the Oginsky Canal between the rivers Pripyat and Neman that allowed the gravel snail *L. naticoides* to penetrate into the Neman River basin, and the nine-spined stickleback *P. pungitius pungitius* – from the Neman to the Pripyat River basin. The Avgustovskiy Canal, which connected the Vistula River and the Neman River (Olenin 2002), served as a pathway for penetration of *Orconectes limosus* (Rafinesque, 1817) from Poland to Belarus (Pikulik et al. 1999).

The majority of the species from the checklist belong to the 'late invaders' group. At least in the case of the Pripyat River basin, most of these species are likely to be introduced during a period of intensive shipping that took place from 1970 to 1993 (Figure 3). The vector for introductions during this period was likely the ballast water discharged by cargo ships in the river ports. This assumption is confirmed by the very high numbers of alien species that we observed in the Mikashevichi and Mozyr ports on the Pripyat River (Annex 2). Nevertheless, other pathways existed that resulted in the introduction of 'late invaders' into Belarus. For example, we found the North American snail *Physella acuta* (Draparnaud 1805) in the Neman River near the Grodno river port (Semenchenko et al. 2008). Most likely, this snail arrived in Belarus through the ornamental pathway, i.e. as aquarium species; nevertheless, its natural spread from Poland via the Avgustovskiy Canal, which connects the Vistula River and the Neman River, is also possible.

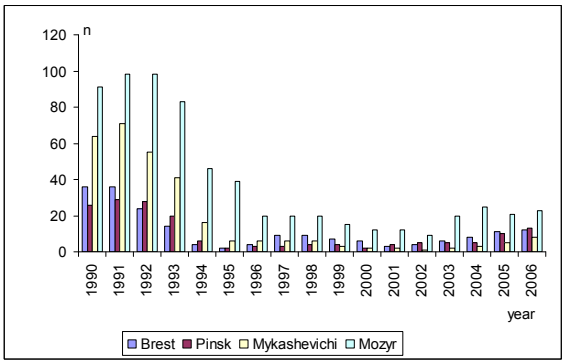

Figure 3. Annual ship records (n) in ports located on the Pripyat River (data provided by the Ministry of Transportation of the Republic of Belarus)

A number of 'late invaders' were intentionally (*P. glenii*) or accidentally (*Pseudorasbora parva* (Temminck and Schlegel, 1846)) introduced into

the waterbodies of Belarus. However, there are some 'late invaders', e.g. the New Zealand mud snail *Potamopyrgus antipodarum* (J.E. Gray, 1853) and polychaete *Hypania invalida* (Grube, 1860), whose invasion pathways are not very clear. Both species could come either from Poland (Alien species in Poland Database 2008) or Ukraine (Alexandrov et al. 2007). Three alien species (*Physella integra* (Haldeman, 1841), *Macrobrachyum nipponense* (De Haan, 1849) and *Ictalurus punctatus* (Rafinesque, 1818) from the 'late' group inhabit only one waterbody, Lake Beloe, which serves as a cooling reservoir of a power station. The first of these species was supposedly introduced into the lake unintentionally with the planting stock of *M. nipponense*. The channel catfish *I. punctatus* was introduced into this lake in 1979 (Shumak and Mischenko 1989).

The group of 'new invaders' includes *Caspiobdella fadejewi* (Selensky, 1915), *Limnomysis benedeni* Czerniavsky, 1882, *Chelicorophium robustum* (Sars, 1895), *Obesogammarus crassus* (Sars, 1894), *Obesogammarus obessus* (Sars, 1894), *Pontogammarus robustoides* (Sars, 1894), *Paramysis lacustris* (Czerniavsky, 1882), *Orconectes limosus*, *Ferrisia fragilis* (Tryon, 1863), *Clupeonella cultriventris* (Nordmann, 1840), *Syngnathus nigrolineatus* Eichwald, 1831 and *Proterorhinus marmoratus* (Pallas, 1814). All these species except *O. limosus* and *P. lacustris* are likely to come from the Ukraine (Alexandrov et al. 2007), either using commercial ships as vectors or alternatively spreading naturally from the Dnieper River basin (in particular, from the Kievskoe Reservoir located close to the Belarusian border). The spiny-cheek crayfish *O. limosus* had naturally dispersed into the Neman River basin from Poland (Alekhnovich 1999; Pikulik et al. 1999), while *P. lacustris* likely spread from Lithuania, where it was acclimatized in the Kaunas Reservoir (Arbačiauskas 2005). All 'new invaders' possess a high potential to spread into other river basins, both within Belarus and also those in adjacent countries. For instance, *Orconectes limosus* is now rapidly dispersing within the Neman River basin (Alekhnovich 1999; Giginyak et al. 2007; this study) and can be expected in the near future to invade the basins of the rivers Pripyat and Zapadnaya Dvina. *Clupeonella cultriventris*, *Obesogammarus obessus* and *Limnomysis benedeni* are currently absent from the basin of the Polish River Vistula (Alien Species in Poland Database 2008) but can penetrate therein from Belarusian waters. In the early 1980s, the tubenose goby *P. marmoratus* was recorded in the Kievskoe Reservoir (Dnieper River, Ukraine) (Naseka et al. 2005). In 2007, this species was first found in the middle and upper parts of the Pripyat River in Belarus (Rizevsky et al. 2007), and soon thereafter arrived in the Vistula River in Poland (Grabowska et al. 2008).

Many studies have shown that the rates of alien species' introductions and dispersal have exponentially increased over a few recent decades throughout the whole World (e.g., Leppäkoski and Olenin 2000; Leppäkoski et al. 2002; Minchin 2007). This pattern is typical for Belarusian river basins as well. For instance, within the past 6-7 years the mysid *Limnomysis benedeni* (Czerniavsky, 1882) has spread from the Ukrainian territory upstream of the middle section of the Pripyat River (Semenchenko et al. 2007). The tubenose goby, *Proterorhinus marmoratus*, has colonised the entire Belarusian section of the Pripyat River over the last 15-20 years (Rizevsky et al. 2007). *Orconectes limosus* has covered the distance from the border between Belarus and Poland to the upper part of the Neman River in the 10 years since its first discovery (Alekhnovich 1999; this study). The unexpected arrival of the North American snail *F. fragilis* in the Pripyat River most likely took place only 5-7 years ago (Semenchenko and Laenko 2008).

Future invasions

The analysis of potential donor areas, which can provide Belarusian river basins with new alien species shows that the Kievskoe Reservoir (Dnieper River, Ukraine) is the most important one. However, both western (Poland) and north-western (Lithuania) directions can also play a certain role in future invasions. Several alien species that invaded Poland from Western Europe may soon arrive in Belarusian river basins, e.g. *Gammarus tigrinus* Sexton, 1939 and *Hemimysis anomala* Sars, 1907 (Jażdżewski et al. 2005). The north-western direction for new invasions relates to the Kaunas Reservoir (Neman River, Lithuania), where a number of Ponto-Caspian invertebrates were acclimatized in the middle 20th century (Arbačiauskas 2005). *Paramysis lacustris* has already entered Lake Drisviaty from Lithuania (Semenchenko et al. 2007). This latter species was also found in the Neman River during our survey of the Grodno river port in 2008.

Copp et al. (2005) have analysed the recent expansion of Ponto-Caspian gobies in Europe and found that the spread of these fishes is facilitated by a range of factors, including such species-specific traits as phenotypic plasticity, a wide range of reproductive tactics and low parasite loads compared to native species, etc. These traits allow gobies to continue their successful expansion into new European river basins. The arrival of several gobiid species in Belarusian waters from the Kievskoe Reservoir is highly probable (Rizevsky and Ermolaeva 2002).

Concluding remarks

The majority of the 35 alien species established in the examined Belarusian river basins are of Ponto-Caspian origin, indicating that Ukraine is the main donor area of aquatic exotic species for Belarus. Several impoundments constructed along the Ukrainian section of the Dnieper River have likely been used as 'stepping-stones' (Havel et al. 2005) by the Ponto-Caspian invaders on their way upstream. The uppermost reservoir in this chain of impoundments, the Kievskoe Reservoir, is very close to the Belarusian border, and will likely serve as the main donor waterbody of invaders for Belarus in the future. However, the 'central European invasion corridor' that includes the Ukrainian part of the Dnieper River (Bij de Vaate et al. 2002; Karatayev et al. 2008) was not the only pathway of alien species introduction into Belarus. At least 4 species could have arrived from Poland (Vistula River basin) and Lithuania (Neman River basin), whereas a number of species have been introduced intentionally. It can be expected that the ongoing development of both market economy and international trade in Belarus will substantially increase the diversity of donor areas, vectors, pathways and, as the result, the rate of introduction of new aquatic alien species.

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Annex 1

Checklist of alien species naturalized in different river basins of Belarus

nn	Taxon*	Native area	Records in river basins			Reference
			Dnieper	Pripyat	Neman	
	CLITELLATA:					
1	*Caspiobdella fadejewi* (Selensky, 1915)	Ponto-Caspian	1976	1999	Not found	Polischuk et al. 1976**; Tischikov and Tischikov 1999; this study
2	*Potamothrix moldaviensis* (Vejdovsky and Mrazek, 1902)	Ponto-Caspian	1956	Not found	Not found	Sokolskaya 1956**
3	*Tubifex newaensis* (Michaelsen, 1903)	Ponto-Caspian	1956	Not found	Not found	Sokolskaya 1956** Vladimirova et al. 1965
	POLYCHAETA:					
4	*Hypania invalida* (Grube, 1860)	Ponto-Caspian	2008	1999	Not found	Tischikov and Tischikov 2005**; this study
	MAXILLOPODA:					
5	*Eurytemora velox* (Lilljeborg, 1853)	Ponto-Caspian	about 1950	1956	Not found	Vezhnovets 2005
	MALACOSTRACA:					
6	*Chaetogammarus ischnus* (Stebbing, 1906)	Ponto-Caspian	2007	2007	Not found	Mastitsky and Makarevich 2007**, this study
7	*Chelicorophium curvispinum* (Sars, 1895)	Ponto-Caspian	2007	1914	Not found	Wolski 1930**, this study
8	*Chelicorophium robustum* (Sars,1895)	Ponto-Caspian	2008	Not found	Not found	this study**
9	*Dikerogammarus haemobaphes* (Eichwald 1841)	Ponto-Caspian	2007	2007	Not found	Mastitsky and Makarevich 2007**, this study
10	*Dikerogammarus villosus* (Sowinski, 1894)	Ponto-Caspian	2007	2007	Not found	Mastitsky and Makarevich 2007**, this study
11	*Limnomysis benedeni* Czerniavsky, 1882	Ponto-Caspian	2007	2008	Not found	Semenchenko et al. 2007**, this study
12	*Macrobrachium nipponense* (De Haan,1849)	Far East	Not found	1982	Not found	Khmeleva and Golubev 1984**
13	*Obesogammarus crassus* (Sars, 1894)	Ponto-Caspian	2007	2007	Not found	Mastitsky and Makarevich 2007**, Semenchenko and Vezhnovets 2008
14	*Obesogammarus obesus* (Sars, 1894)	Ponto-Caspian	2008	2008	Not found	Semenchenko and Vezhnovets 2008**
15	*Orconectes limosus* (Rafinesque, 1817)	North America	Not found	Not found	1999	Alekhnovich 1999**
16	*Paramysis lacustris* (Czerniavsky, 1882)	Ponto-Caspian	2008	Not found	2006	Semenchenko et al. 2007**
17	*Pontogammarus robustoides* (Sars, 1894)	Ponto-Caspian	2007	Not found	Not found	Mastitsky and Makarevich 2007**, this study
	BIVALVIA:					
18	*Dreissena polymorpha* (Pallas,1771)	Ponto-Caspian	Unknown date	Unknown date	Unknown date	Ovchinnikov 1933** Karatayev et al. 2003
	GASTROPODA:					
19	*Ferrisia fragilis* (Tryon, 1863)	North America	Not found	2008	Not found	Semenchenko and Laenko 2008**
20	*Lithoglyphus naticoides* (C. Pfeiffer, 1828)	Ponto-Caspian	Not found	1907	2007	Rozen 1907**, this study

Annex 1 (continued)

nn	Taxon*	Native area	Records in river basins			Reference
			Dnieper	Pripyat	Neman	
21	*Physella acuta* (Draparnaud 1805)	North America	Not found	1983	2008	Naumova et al. 1983**, Semenchenko and Laenko 2008
22	*Physella intergra* (Haldeman, 1841)	New Zealand	Not found	1988	Not found	Karatayev 1988**
23	*Potamopyrgus antipodarum* (J.E. Gray, 1853)	New Zealand	Not found	1976	Not found	Polischuk et al. 1976**
	ACTINOPTERYGII:					
24	*Ameiurus nebulosus* (LeSueur, 1819)	North America	Not found	1948	Not found	Ivlev and Protasov 1948**
25	*Carrasius auratus gibelio* (Bloch, 1782),	Far East, China	Unknown date	Unknown date	Unknown date	Zelensky 1864**, Zhukov 1988
26	*Clupeonella cultriventris* (Nordmann, 1840)	Ponto-Caspian	Not found	1986	Not found	this study**
27	*Ictalurus punctatus* (Rafinesque, 1818)	North America	Not found	1979	Not found	Shumak and Mischenko 1989**
28	*Neogobius fluviatilis* (Pallas, 1814)	Ponto-Caspian	1936	1957	Not found	Vorontzov 1937**, Voronin 1957
29	*Neogobius gymnotrachelus* (Kessler, 1857)	Ponto-Caspian	1993	1993	Not found	Gulugin and Kunitsky 1999**
30	*Neogobius melanostomus* (Pallas, 1814)	Ponto-Caspian	About 1990	1993	Not found	Gulugin and Kunitsky 1999**
31	*Perccottus glenii* (Dybowsky, 1877)	Far East	About 2005	2007	2007	this study**
32	*Proterorhinus marmoratus* (Pallas, 1814)	Ponto-Caspian	1986	2007	Not found	Smirnov 1986**, Rizevsky et al. 2007, this study
33	*Pseudorasbora parva* (Temminck and Schlegel, 1846	Far East	1998	Not found	Not found	Kunitskiy and Pluta 1999**
34	*Pungitius platygaster platygaster* (Kessler, 1859)	Ponto-Caspian	2008	Not found	Not found	this study**
35	*Pungitius pungitius pungitius* (Linnaeus, 1758)	Baltic Sea	Not found	About 1800	native	this study**
36	*Syngnathus nigrolineatus* Eichwald, 1831	Ponto-Caspian	2008	Not found	Not found	this study**

*The taxonomy of species is in accordance with the Integrated Taxonomic Information System (http://www.itis.gov)
** Reference for first record

Annex 2

The number of alien species on the main sites of Dnieper, Pripyat and Neman river basins and Pripyat-Bug canal (see Figure 1)

Site	River basin, settlement, Coordinates: latitude °N, longitude °E	Alien invertebrates	Alien fish
1	Dnieper, Nizhnie Zhary 51°17.23', 30°34.36'	*Chaetogammarus ischnus* *Chelicorophium curvispinum* *Chelicorophium robustum* *Dikerogammarus chaemobaphes* *Dikerogammarus villosus* *Dreissena polymorpha* *Eurytemora velox* *Limnomysis benedeni* *Lithoglyphus naticoides* *Obesogammarus crassus* *Obesogammarus obesus* *Paramysis lacustris* *Pontogammarus robustoides*	*Neogobius fluviatilis* *Neogobius gymnotrachelus* *Neogobius melanostomus* *Proterorhinus marmoratus* *Pungitius platygaster* *Syngnathus nigrolineatus*
2	Dnieper, Loev 51°57.38', 30°48.18'	*Chaetogammarus ischnus* *Dikerogammarus haemobaphes* *Dikerogammarus villosus* *Eurytemora velox* *Obesogammarus crassus* *Obesogammarus obesus*	*Neogobius fluviatilis* *Neogobius gymnotrachelus*
3	Dnieper, Rechitsa 52°19.50', 30°31.07'	*Chelicorophium curvispinum* *Dikerogammarus haemobaphes* *Dikerogammarus villosus* *Dreissena polymorpha* *Lithoglyphus naticoides* *Obesogammarus crassus* *Obesogammarus obesus*	*Neogobius fluviatilis* *Neogobius gymnotrachelus*
4	Dnieper, Rogachev 52°09.26', 30°38.18'	*Dikerogammarus haemobaphes* *Dreissena polymorpha*	No data
5	Pripyat, Narovlya 51°51.52', 29°29.07'	*Chaetogammarus ischnus* *Chelicorophium curvispinum* *Dikerogammarus haemobaphes* *Dikerogammarus villosus* *Eurytemora velox* *Limnomysis benedeni* *Lithoglyphus naticoides* *Obesogammarus crassus* *Obesogammarus obesus*	*Neogobius fluviatilis* *Neogobius gymnotrachelus*
6	Pripyat, Mozyr 52°07.01', 28°32.43'	*Chaetogammarus ischnus* *Chelicorophium curvispinum* *Dikerogammarus haemobaphes* *Dikerogammarus villosus* *Eurytemora velox* *Limnomysis benedeni* *Lithoglyphus naticoides* *Obesogammarus crassus* *Obesogammarus obesus*	*Neogobius fluviatilis* *Neogobius melanostomus*
7	Pripyat, Kostyukovichy 52°07.33', 28°32.43'	*Chelicorophium curvispinum* *Dikerogammarus villosus* *Dreissena polymorpha* *Eurytemora velox* *Lithoglyphus naticoides* *Obesogammarus crassus*	*Neogobius fluviatilis* *Neogobius melanostomus* *Proterorhinus marmoratus*

Annex 2 (continued)

The number of alien species on the main sites of Dnieper, Pripyat and Neman river basins and Pripyat-Bug canal (see Figure 1)

Site	River basin, settlement, Coordinates: latitude, °N, longitude, °E	Alien invertebrates	Alien fish
8	Pripyat, Pererovskiy Mlynok 52°02.99', 26°09.82'	*Chaetogammarus ischnus* *Dikerogammarus haemobaphes* *Dikerogammarus villosus* *Eurytemora velox* *Limnomysis benedeni* *Obesogammarus crassus*	*Clupeonella cultriventris* *Neogobius fluviatilis* *Neogobius melanostomus* *Percottus glenii* *Proterorhinus marmoratus*
9	Pripyat, Mikashevichi 52°05.38', 28°32.49'	*Chaetogammarus ischnus* *Chelicorophium curvispinum* *Dikerogammarus haemobaphes* *Dikerogammarus villosus* *Dreissena polymorpha* *Eurytemora velox* *Ferrissia fragilis* *Limnomysis benedeni* *Obesogammarus crassus* *Obesogammarus obesus*	*Clupeonella cultriventris* *Neogobius fluviatilis* *Neogobius melanostomus* *Percottus glenii* *Proterorhinus marmoratus*
10	Pripyat, Pinsk 52°06.18', 26°04.41'	*Chaetogammarus ischnus* *Dikerogammarus haemobaphes* *Dikerogammarus villosus* *Dreissena polymorpha* *Eurytemora velox* *Ferrisia fragilis* *Lithoglyphus naticoides*	*Neogobius fluviatilis* *Neogobius melanostomus* *Proterorhinus marmoratus*
11	Dnieper-Bug Canal, Dubai 52°06.37', 26°06.16'	*Dikerogammarus haemobaphes* *Dreissena polymorpha* *Eurytemora velox*	*Neogobius melanostomus* *Pungitius pungitius*
12	Dnieper-Bug Canal, Kobrin 52°11.28', 24°45.50'	*Dreissena polymorpha* *Eurytemora velox* *Dikerogammarus haemobaphes* *Lithoglyphus naticoides*	*Neogobius fluviatilis* *Neogobius melanostomus*
13	Mukhovetz, Brest 52°05.00', 23°41.53'	*Dikerogammarus haemobaphes,* *Dikerogammarus villosus* *Dreissena polymorpha* *Eurytemora velox* *Hypania invalida* *Lithoglyphus naticoides*	*Neogobius fluviatilis* *Neogobius melanostomus*
14	Neman, Grodno 53°40.46', 23°46.03'	*Dreissena polymorpha* *Lithoglyphus naticoides* *Orconectes limosus* *Paramysis lacustris* *Physella acuta*	*Percottus glenii* *Pungitius pungitius*
15	Neman, Gozha 53°56.46', 23°55.08'	*Dreissena polymorpha* *Lithoglyphus naticoides* *Orconectes limosus* *Paramysis lacustris*	*Pungitius pungitius*