Gravel Snail (*Lithoglyphus naticoides*)

Ecological Risk Screening Summary

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Photo: Jan Steger, Public Domain

1 Native Range and Status in the United States

Native Range

From Van Damme (2011):

"This species is originally native to the Ponto-Caspian region,"

"Native: Bulgaria; Romania; Russian Federation (Kaliningrad); Ukraine"

"Present – origin uncertain: Serbia (Serbia, Serbia)"

Status in the United States
No records of *Lithoglyphus naticoides* in the United States were found.

Means of Introductions in the United States
No records of *Lithoglyphus naticoides* in the United States were found.

Remarks
No additional remarks.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing
From Seddon and Rowson (2016):

"Accepted scientific name: *Lithoglyphus naticoides* C. Pfeiffer, 1828 (accepted name)"

"Kingdom Animalia
Phylum Mollusca
Class Gastropoda
Order Littorinimorpha
Superfamily Rissoidea
Family Hydrobiidae
Genus *Lithoglyphus*"

Size, Weight, and Age Range
From Van Damme (2011):

"The species has a lifespan of 13-15 months (although lifespans of 16-17 months have been reported in the Netherlands) (Mouthon 2007)."

Environment
From Van Damme (2011):

"This species is known from depths of 0-6 m depth in Lake Lukomskoe (Belarus) (Mastitsky and Samoilenko 2006)."

"Threats to this species include water pollution and habitat degradation throughout its range; however, the species appears to be tolerant of poor environmental conditions and siltation (László et al. 2001)."

Climate/Range
Information on the climate requirements of *Lithoglyphus naticoides* was not found.

Distribution Outside the United States

Native

From Van Damme (2011):

"This species is originally native to the Ponto-Caspian region,"

"Native: Bulgaria; Romania; Russian Federation (Kaliningrad); Ukraine"

"Present – origin uncertain: Serbia (Serbia, Serbia)"

Introduced

From Van Damme (2011):

"[…] and has since expanded its range across Europe, becoming a common component of many lakes and rivers (Mastitsky 2007, Tyutin and Slynko 2010) […] and the main range extension of this species has taken place in the 19th to 20th century (Mouthon 2007). The recent expansion in north-east Europe is spectacular; having been introduced in the Volga delta in the 1990s, the species has presently reached a number of deltas in the Upper Volta (Tyutin and Slynko 2007). This species is widespread, occuring [sic] from eastern France and the Netherlands, to Ukraine and Russia, north to Latvia and south to Bosnia and Herzegovina."

"Introduced: Austria; Belarus; Belgium; Bosnia and Herzegovina; Croatia; Czech Republic; France (France (mainland)); Germany; Hungary; Latvia; Lithuania; Netherlands; Poland; Slovakia; Slovenia"

Means of Introduction Outside the United States

From Van Damme (2011):

"The invasion of species from the Ponto-Caspian region throughout Europe has been facilitated via inland migration corridors (Bij de Vaate et al. 2002)"

From Mastitsky and Samoilenko (2006):

"Bij de Vaate et al. (2002) distinguish three main corridors of migration of macroinvertebrates from Ponto-Caspian region to Europe: (i) a northern corridor: Volga River > Lake Beloye > Lake Onega > Lake Ladoga > Neva River > Baltic Sea; (ii) a central corridor: rivers Dnieper > Vistula > Oder > Elbe > Rhine, and (iii) a southern corridor connecting the rivers Danube and Rhine. The modern pattern of *L. naticoides* distribution in Europe implies that the northern and central corridors could have been the main routs of its migration (Starobogatov 1970, Bij de Vaate et al. 2002)."

From Arbačiauskas et al. (2011):

"Natural dispersal seems to be responsible for upstream expansion of the species in the tributaries of the Nemunas River, whilst invasion into the Elektrėnai WR most probably resulted from human-mediated accidental introduction (Figure 1D [in source material])."

From Butkus et al (2014):

"Inland shipping between the Nemunas and Dnieper river basins is considered to be the main vector of the primary invasion (Arbačiauskas et al. 2011a)."

Short Description

A short description of *Lithoglyphus naticoides* was not found.

Biology

From Van Damme (2011):

"[…] feeding upon diatoms, algal debris and particulate organic matter (Mouthon 2007). This species spawns annually from March to June, and females lay eggs on the shells of their congeners."

"This species inhabits the lower reaches of large rivers, canals and is also found more rarely in lakes. It occurs on rocky, sandy and muddy substrates,"

Human Uses

Information on human uses of *Lithoglyphus naticoides* was not found.

Diseases

No records of OIE reportable diseases were found.

From Tyutin and Slynko (2010):

"Together with their intermediate host, narrow specific parasites, in particular, trematodes *Nicolla skrjabini* (Iwanitzky, 1928), *Apophallus muehlingi* (Jagerskiold, 1898), and *Apophallus* (=*Rossicotrema*) *donicus* (Skrjabin et Lindtrop, 1919), began to disperse."

From Mastitsky (2007):

"Three species of trematodes were observed to infect *L. naticoides* in Lake Lukomskoe (Table 1 [in source matieral]). Two of them, *Sphaerostomum bramae* (Müller, 1776) (family Opecoelidae) and *Palaeorchis* sp. (family Monorchidae) are widely distributed fish parasites, […]. In contrast, *Rossicotrema donicum* Skrjabin et Lindtrop, 1919 (family Heterophyidae; Figure 1) is highly specific to *Lithoglyphus* (Ivanov and Semenova 2004, Biserova 2005), indicating that this parasite might be co-introduced into the lake along with the snail."

Threat to Humans

From Karatayev et al. (2008):

"*A. muehlingi* [a parasite of *Lithoglyphus naticoides*] is also pathogenic to the final hosts, i.e. birds and mammals (including humans) (Biserova 2005)."

3 Impacts of Introductions

From Karatayev et al. (2008):

"For example, invasion of *L. naticoides* into the River Volga Delta was accompanied with cointroduction of the trematode *Apophallus muehlingi*, which is highly pathogenic to its second intermediate hosts, i.e. cyprinid fishes. Extremely high density reached by *Lithoglyphus* in the River Volga (up to 8800 ind/m2) resulted in serious epizootics, especially among susceptible young fishes, whose death rate was up to 80% (Biserova 1990). *A. muehlingi* is also pathogenic to the final hosts, i.e. birds and mammals (including humans) (Biserova 2005)."

From Mastitsky (2007):

"[…] In contrast, *Rossicotrema donicum* Skrjabin et Lindtrop, 1919 [a fish parasite] (family Heterophyidae; Figure 1) is highly specific to *Lithoglyphus* (Ivanov and Semenova 2004, Biserova 2005), indicating that this parasite might be co-introduced into the lake along with the snail.

The finding of *R. donicum* in Lake Lukomskoe presents an alarming signal. Metacercariae of this parasite cause a type of lethal 'black-spotted disease' in perch and some cyprinid fishes as they embed themselves into the skin, musculature and fins of the hosts (Figure 2 [in source material]). Feeding on infected fish can in turn lead to highly pathogenic effects in birds and mammals, including humans (Biserova 2005). When interviewed, several amateur fishermen reported increasing numbers of fish in recent catches from Lake Lukomskoe exhibiting symptoms of blackspotted disease (Leonid D. Burko, Belarusian State University, personal communication)."

4 Global Distribution

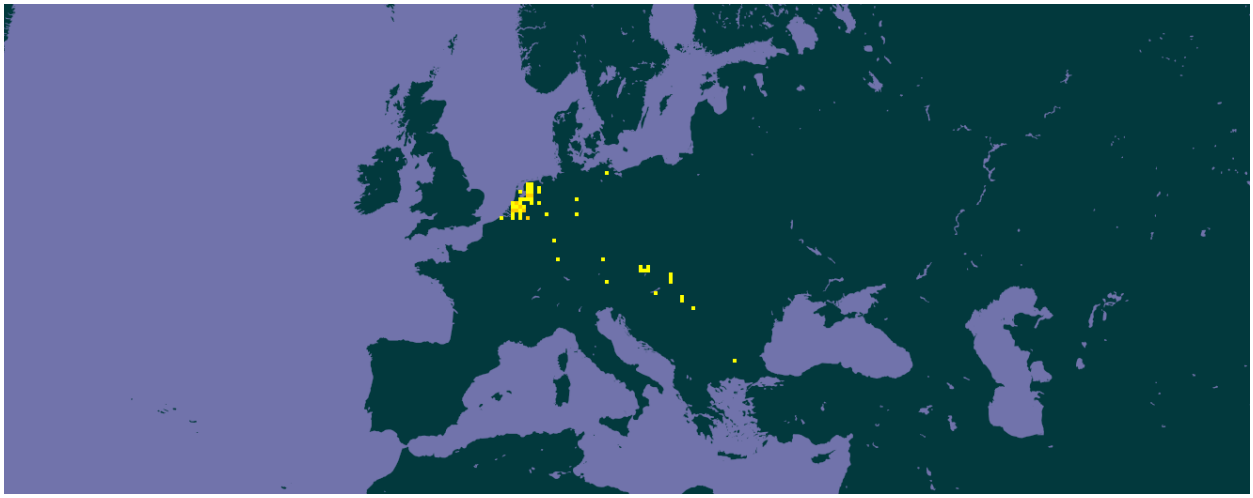

Figure 1. Known -global distribution of *Lithoglyphus naticoides*. Map from GBIF Secretariat (2016).

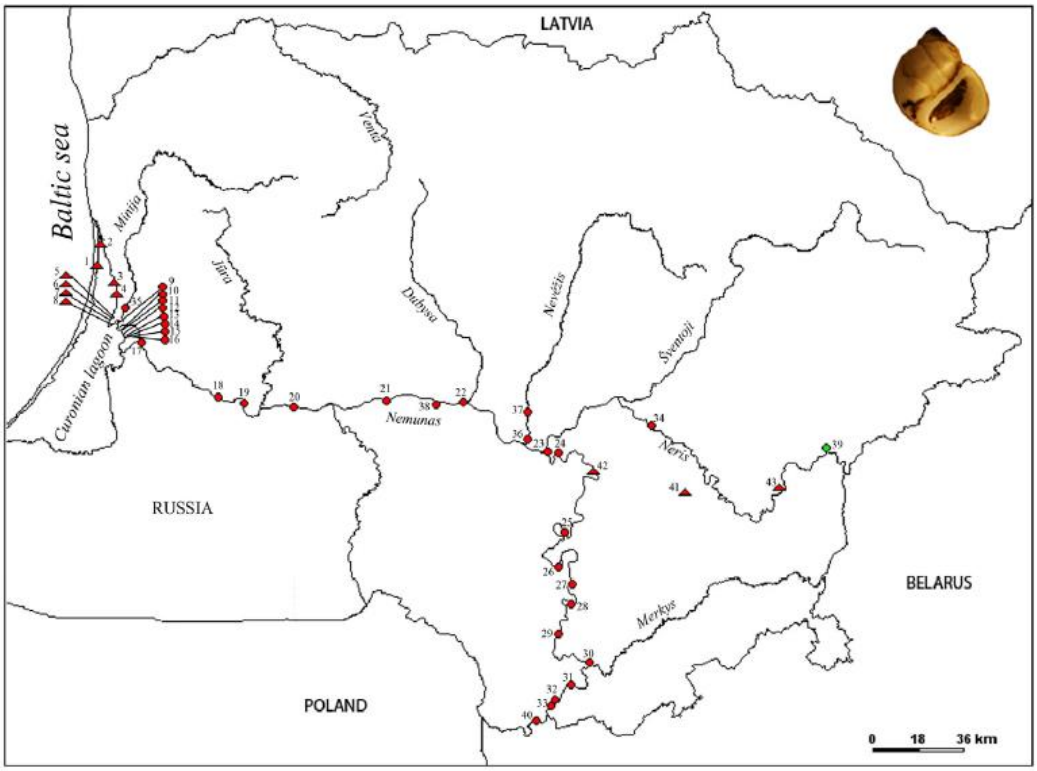

Figure 2. Distribution of *Lithoglyphus naticoides* in Lithuania. Map from Butkus et al (2014; Figure 3).

5 Distribution Within the United States

No records of *Lithoglyphus naticoides* in the United States were found.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Lithoglyphus naticoides* was medium for much of the country with the highest matches around the Great Lakes and in parts of the Great Plains. It was low along the Gulf Coast, Pacific Coast, and northern mid-west. The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean Distance) for the contiguous U.S. was 0.147, high, and individually high for Arizona, Colorado, Illinois, Indiana, Maryland, Michigan, Missouri, Montana, New Mexico, New York, Ohio, Pennsylvania, Utah, Virginia, and West Virginia.

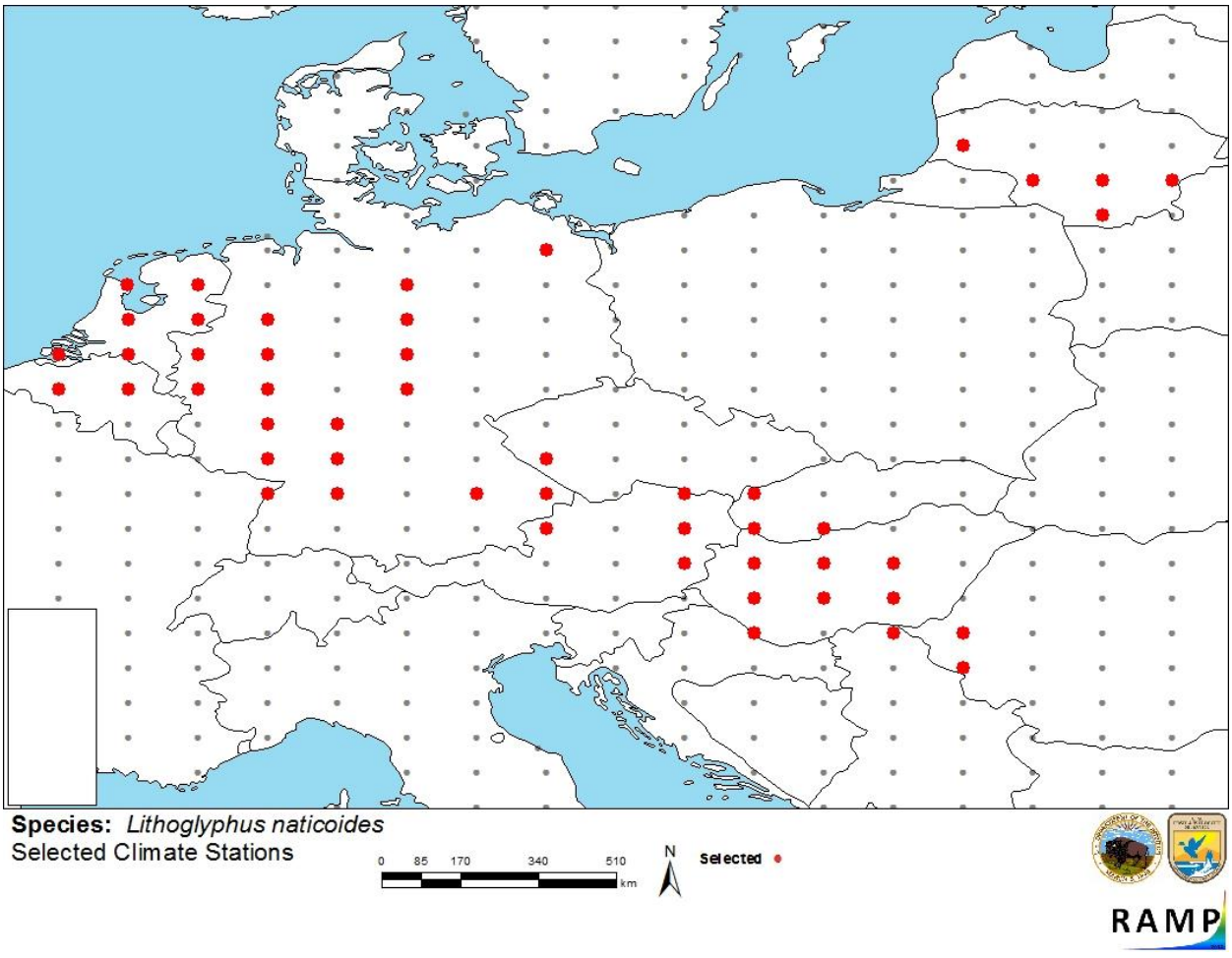

Figure 3. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (grey) for *Lithoglyphus naticoides* climate matching. Source locations from Butkus et al (2014) and GBIF Secretariat (2016).

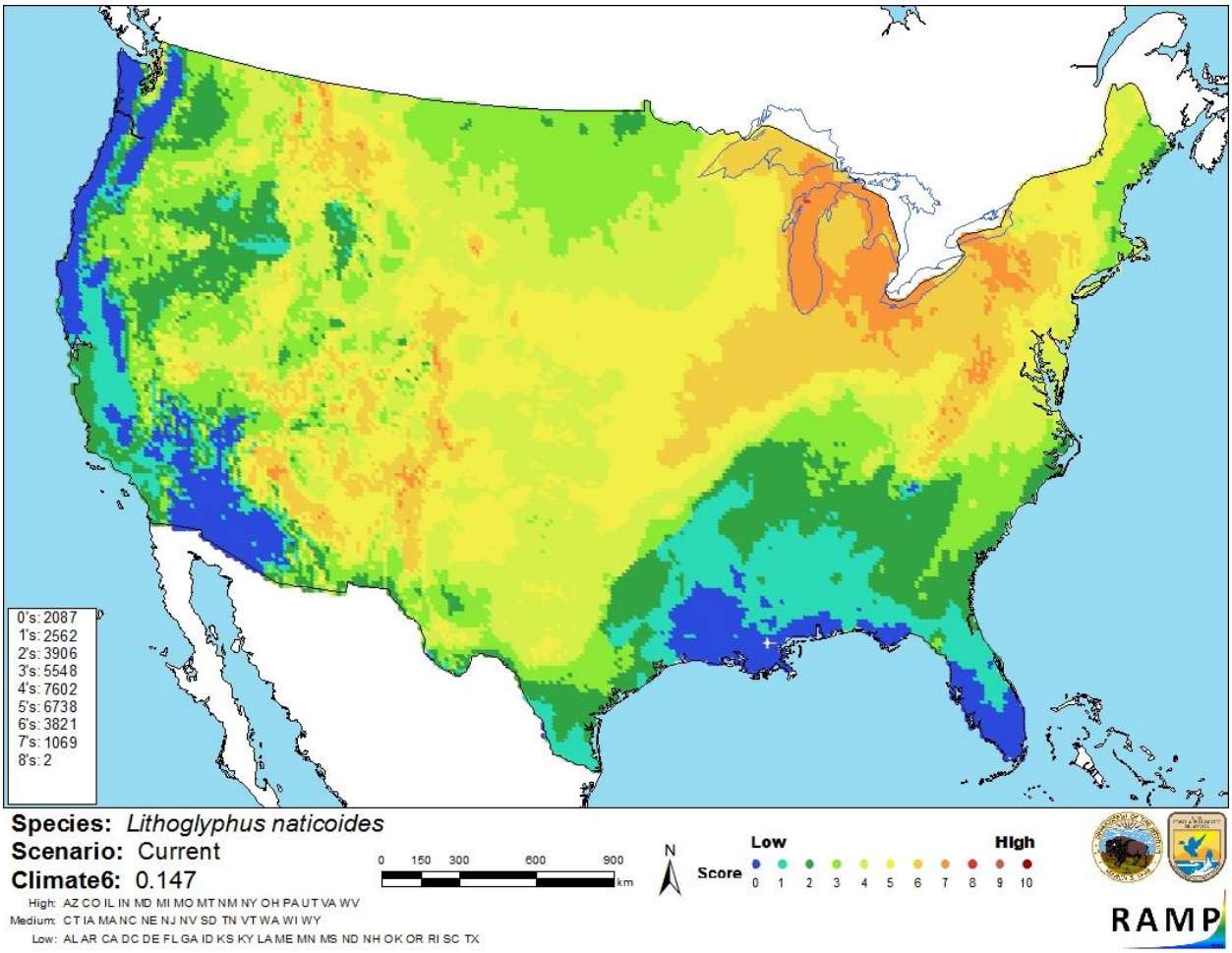

Figure 4. Map of RAMP (Sanders et al. 2014) climate matches for *Lithoglyphus naticoides* in the contiguous United States based on source locations reported by Butkus et al. (2014) and GBIF Secretariat (2016). 0 = Lowest match, 10 = Highest match.

The High, Medium, and Low Climate match Categories are based on the following table:

Climate 6: Proportion of (Sum of Climate Scores 6-10) / (Sum of total Climate Scores)	Climate Match Category
0.000≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

7 Certainty of Assessment

The certainty of assessment for *Lithoglyphus naticoides* is high. There was adequate information available for this species. The few informational gaps present do not impact the certainty of assessment. A long history of non-native introductions was found and at least one significant impact has been documented.

8 Risk Assessment

Summary of Risk to the Contiguous United States

The history of invasiveness is high. There is a long documented history of *Lithoglyphus naticoides* introductions and spread through canal systems in Europe. A least one documented of significant impact on native Cyprinid species was found. It can also be a vector for human disease. The climate match is high. The highest matches were around the Great Lakes and parts of the Great Plains. The certainty of assessment is medium. The overall risk assessment category is high.

Assessment Elements

- **History of Invasiveness (Sec. 3): High**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): High**
- **Remarks:** No additional remarks
- **Overall Risk Assessment Category: High**

9 References

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 10.

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GBIF Secretariat. 2016. GBIF backbone taxonomy: *Lithoglyphus naticoides* (C.Pfeiffer, 1828). Global Biodiversity Information Facility, Copenhagen. Available: http://www.gbif.org/species/5777912. (June 2016).

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Mastitsky, S. E. 2007. First report of parasites in *Lithoglyphus naticoides* (Gastropoda: Hydrobiidae) from Lake Lukomskoe (Belarus). Aquatic Invasions 2(2):149–151.

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Tyutin, A. V., and Y. Slynko. 2010. The first finding of the Black Sea Snail *Lithoglyphus naticoides* (Gastropoda) and its associated species specific Trematoda in the Upper Volga Basin. Russian Journal of Biological Invasions 1(1):45–49.

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10 References Quoted But Not Accessed

Note: The following references are cited within quoted text within this ERSS, but were not accessed for its preparation. They are included here to provide the reader with more information.

Bij de Vaate, A., K. Jazdzewski, H. A. M. Ketelaars, S. Gollasch, and G. Van der Velde. 2002. Geographic patterns in range extension of Ponto-Caspian macroinvertebrate species in Europe. Canadian Journal of Fisheries and Aquatic Science 59(7):1159–1174.

Biserova, L. I. 1990. Occurrence and distribution of *Lithoglyphus naticoides* (Gastropoda, ithoglyphidae) in the Volga Delta. Gydrobiologicheskiy zhurnal 26(2):98–100. (In Russian.)

Biserova, L. I. 2005. The trematodes *Apophallus muehlingi* and *Rossicotrema donicum* – parasites of fishes of the River Volga Delta (peculiarities of ecology and induced diseases). Doctoral dissertation. Institute of parasitology of the Russian Academy of Sciences, Moscow. (In Russian.)

Ivanov, V. M., and M. N. Semenova. 2004. Life cycle of the trematode *Rossicotrema donicum* (Opistorchiida, Heterophyidae) in the Volga River Delta. Zoologicheskiy Zhurnal 83(10):1206–1215

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Tyutin, A. V., and Y. Slynko. 2010. The first finding of the Black Sea Snail *Lithoglyphus naticoides* (Gastropoda) and its associated species specific Trematoda in the Upper Volga Basin. Russian Journal of Biological Invasions 1(1):45–49.