

European firebellied toad (*Bombina bombina*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, April 2016
Revised, March 2017, April 2016
Web Version, 6/13/2018



Photo: Marek Szczepanek. Licensed under GNU Free Documentation License, Version 1.2.
Available:
[https://commons.wikimedia.org/wiki/File:Bombina_bombina_1_\(Marek_Szczepanek\)_tight_crop.jpg](https://commons.wikimedia.org/wiki/File:Bombina_bombina_1_(Marek_Szczepanek)_tight_crop.jpg).

1 Native Range and Status in the United States

Native Range

From Agasyan et al. (2009):

“This species is found in central and eastern Europe ranging from Denmark, southern Sweden and northern Germany eastwards to the Ural Mountains of Russia, southwards to the Danube

floodplain, Turkey (Thrace and the vicinity of Adapazari *B. b. arifiyensis* in north-western Anatolia), and the northern slopes of the Caucasus Mountains.”

“There are no recent records from Greece, but its range in this country has not been surveyed for many years. The species is common in parts of European Russia, Ukraine and Moldavia, and while it is unlikely to be declining on this territory in general, many local populations are declining.”

“This species has been successfully reintroduced to some sites in Sweden (Arnold, 2003), as of 2008 there are 10,000 adults in 3,000 breeding ponds.”

From Kuzmin (2016):

“The species inhabits Central and Eastern Europe. The Central European part of the range is divided by the Carpathian Mountains. The glacial refugia of *B. bombina* are supposed to be in the steppes bordering the Black and Caspian seas. The western margin of the range runs approximately by Germany (Schleswig-Holstein, Lower Saxony, Sachsen-Anhalt, Dresden and Gorlitz), Czech Republic, Northeast Austria, Eastern Yugoslavia, Greece, Bulgaria, Romania and Western Turkey. The northern margin of the range runs from the area southwest to the Swedish province of Skane through Denmark to the Baltic Sea through Byelorussia and Central European Russia to Preuralia (Bashkiria) and Urals (Chelyabinsk Province). The southern margin of the range seems to be limited with the mountains of Balkan Peninsula; however, it occurs in Western Turkey (Anatolia: Sakarya River). The toad is known from the Northern Crimea. In the south of the European part of the former Soviet Union it occurs mainly in river valleys, including those in Precaucasia and Precaspian region. Then the range extends through the Southern Urals to the Northern Kazakhstan.”

Status in the United States

There are no records of *Bombina bombina* in the United States.

Means of Introductions in the United States

There are no records of *Bombina bombina* in the United States.

Remarks

From Agasyan et al. (2009):

“This species is listed on Appendix II of the Bern Convention and on Annexes II and IV of the EU Natural Habitats Directive. It is protected by national legislation in many countries, occurs in many protected areas, and is listed in many national and sub-national Red Data books and lists.”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2016):

“Taxonomic Status:

Current Standing: valid”

“Kingdom Animalia

Subkingdom Bilateria

Infrakingdom Deuterostomia

Phylum Chordata

Subphylum Vertebrata

Infraphylum Gnathostomata

Superclass Tetrapoda

Class Amphibia

Order Anura

Family Bombinatoridae

Genus *Bombina*

Species *Bombina bombina* (Linnaeus, 1761)”

Size, Weight, and Age Range

From Kuzmin (2016):

“[...] longevity in nature reaches at least 12 years.”

Environment

From Agasyan et al. (2009):

“It is a lowland species that occurs from sea level up to a maximum of 730m asl (in western Bohemia).”

“At the southeastern margin of its distribution, the species lives in permanent freshwater bodies in river valleys surrounded by an arid saline landscape (solonetz-solonchak complex).”

From Kuzmin (2016):

“The toads prefer relatively warm conditions: they are active at +10 - +30°C [assumed to be water temperature], usually +18 - +20°C.”

Climate/Range

No information on the climate requirements of *Bombina bombina* was found.

Distribution Outside the United States

Native

From Agasyan et al. (2009):

“This species is found in central and eastern Europe ranging from Denmark, southern Sweden and northern Germany eastwards to the Ural Mountains of Russia, southwards to the Danube floodplain, Turkey (Thrace and the vicinity of Adapazari *B. b. arifiyensis* in north-western Anatolia), and the northern slopes of the Caucasus Mountains.”

“There are no recent records from Greece, but its range in this country has not been surveyed for many years. The species is common in parts of European Russia, Ukraine and Moldavia, and while it is unlikely to be declining on this territory in general, many local populations are declining.”

“This species has been successfully reintroduced to some sites in Sweden (Arnold, 2003), as of 2008 there are 10,000 adults in 3,000 breeding ponds.”

From Kuzmin (2016):

“The species inhabits Central and Eastern Europe. The Central European part of the range is divided by the Carpathian Mountains. The glacial refugia of *B. bombina* are supposed to be in the steppes bordering the Black and Caspian seas. The western margin of the range runs approximately by Germany (Schleswig-Holstein, Lower Saxony, Sachsen-Anhalt, Dresden and Gorlitz), Czech Republic, Northeast Austria, Eastern Yugoslavia, Greece, Bulgaria, Romania and Western Turkey. The northern margin of the range runs from the area southwest to the Swedish province of Skane through Denmark to the Baltic Sea through Byelorussia and Central European Russia to Preuralia (Bashkiria) and Urals (Chelyabinsk Province). The southern margin of the range seems to be limited with the mountains of Balkan Peninsula; however, it occurs in Western Turkey (Anatolia: Sakarya River). The toad is known from the Northern Crimea. In the south of the European part of the former Soviet Union it occurs mainly in river valleys, including those in Precaucasia and Precaspian region. Then the range extends through the Southern Urals to the Northern Kazakhstan.”

Introduced

From Agasyan et al. (2009):

“It has been introduced to the United Kingdom (one colony in Surrey).”

Means of Introduction Outside the United States

No information on the means of introduction outside the United States was found.

Short Description

From Kuzmin (2016):

“Tympanic membrane absent. Transversal processes of the vertebra sacralis notably widened. Pupil of the eye triangular. Skin tuberculate. Dorsal tubercles rounded rather than coming to a point. Dorsal surface dark-grayish to almost black, with large dark spots. In pools with opaque water, a sandy bottom and scarce riparian vegetation, the toads sometimes possess a bright-green dorsal coloration with scarce dark-green spots. Belly red or orange, with large bluish-black spots and numerous white points. On the belly, the bright coloration does not exceed the dark coloration in area. The inner surface of the leg is covered with small bright spots, which are not fused. In contrast to the female, the male has internal resonators, a slightly larger head and, during the breeding season, black nuptial pads on the 1st and 2nd fingers and on the inner surface of his forearm.”

Biology

From Agasyan et al. (2009):

“The species breeds by larval development in pools with a good growth of sub-aquatic vegetation. Hybrid populations of this species with *B. variegata* have been recorded.”

“Within Europe this species is associated with lowland areas of marshy or grassy wetlands, often along river valleys, with small, shallow, often-temporary lakes and ponds. In the former Soviet Union it has been reported from steppe, forest steppe, broad-leaved and mixed leafed coniferous forests, but it also inhabits open landscapes, using drainage channels as pathways for dispersal.”

“At the southeastern margin of its distribution, the species lives in permanent freshwater bodies in river valleys surrounded by an arid saline landscape (solonetz-solonchak complex). It is primarily an aquatic animal living in shallow (less than 50-70cm depth) stagnant lakes, ponds, pools, swamps, peat bogs, ditches, flooded rice fields and quarries. It may occasionally be found in semi-flowing waters: springs, irrigation channels, rivers and stream pools and the water must generally be clear (for example in the Carpathian region, *B. bombina* lives in wetlands with clearer water than the congeneric *Bombina variegata*); however, near the southern margin of the range (such as southeastern Ukraine and the Krasnodar Region) the species often occurs in waters that have been polluted with industrial and agricultural chemicals such as settling and sedimentation reservoirs, rice fields, polluted ponds in rural and urban areas.”

From Kuzmin (2016):

“Active individuals are found in the daytime, but the maximum calling by males occurs at dusk, whereas during windy or cold weather toad activity decreases. Fire-Bellied Toads stay in the water or near the shore; terrestrial migrations occur mainly at high air humidity, as a rule at night. Hibernation occurs from the end of September or October (sometimes the beginning of November) to late March or April. The toad hibernates in the mud on the bottom of water bodies or on land. The breeding season extends from May to the end of summer. During this time, male vocalizes floating on the water surface, with body flattened. Sometimes he is able to call from under the water. Amplexus is pelvic. The clutch contains 80-300 eggs, sometimes more,

deposited in portions. Embryonic and larval development takes 2-2.5 months. Metamorphosis extends from the second half of June to the end of September. As a rule, it peaks in July-August. Recently metamorphosed toadlets stay in the water and near the shore. [...] Sexual maturity is attained in the 2nd-4th year of life, [...]"

"Tadpoles consume mainly algae and higher plants, lower animals frequently are eaten. Newly metamorphosed toadlets prey mainly on insects (Coleoptera, Hymenoptera, Diptera), adults consume mainly various insects. More than half of their diet of adults may consist of aquatic invertebrates, but terrestrial animals are also numerous. Variation in the proportion of aquatic prey in different samples reflects the extent of terrestriality [sic] the toad in different landscapes and seasons. During the breeding season, feeding is not stopped."

"When faced with a potential predator, *B. bombina* exhibits a defensive posture called the unkenreflex. It turns over and curves its bright belly upward, covering the eyes with its palms. Otherwise, it may not turn over but instead curve its body downward, lift up the head, and curve the extremities showing the bright spots on its flanks and on the ventral surface of the extremities. Despite the venomous skin secretions in the Fire-Bellied Toad, many vertebrates regularly consume its adults and juveniles. For example, its proportion in the diet of *Nycticorax nycticorax* in Ukraine may reach 25%."

Human Uses

From Agasyan et al. (2009):

"Additional localized threats to this species include mortality on roads, entrapment in open wells with vertical walls, hybridization and replacement by *Bombina variegata* and collection for the pet trade."

Diseases

Infection with *Batrachochytrium dendrobatidis* is reportable to OIE.

From Baláz et al. (2014):

"Infected [with *Batrachochytrium dendrobatidis*] amphibians were sampled in Slovakia, the Czech Republic, and Hungary (9/42 sites) and included the common toad (*Bufo bufo*, Bufonidae), European fire-bellied toad (*Bombina bombina*), yellow-bellied toad (*Bombina variegata*) (Bombinatoridae), common frog (*Rana temporaria*), and green frogs (*Pelophylax kl. esculentus*)."

From McAllister et al. (2010):

"Other reported hosts [of *Aplectana macintoshii*]: [...] European fire-bellied toad, *Bombina bombina* (Vojtkova, 1976; Baker, 1980): [...]"

Threat to Humans

No information on threats to humans from *Bombina bombina* was found.

3 Impacts of Introductions

No information on impacts of introductions of *Bombina bombina* was found.

4 Global Distribution

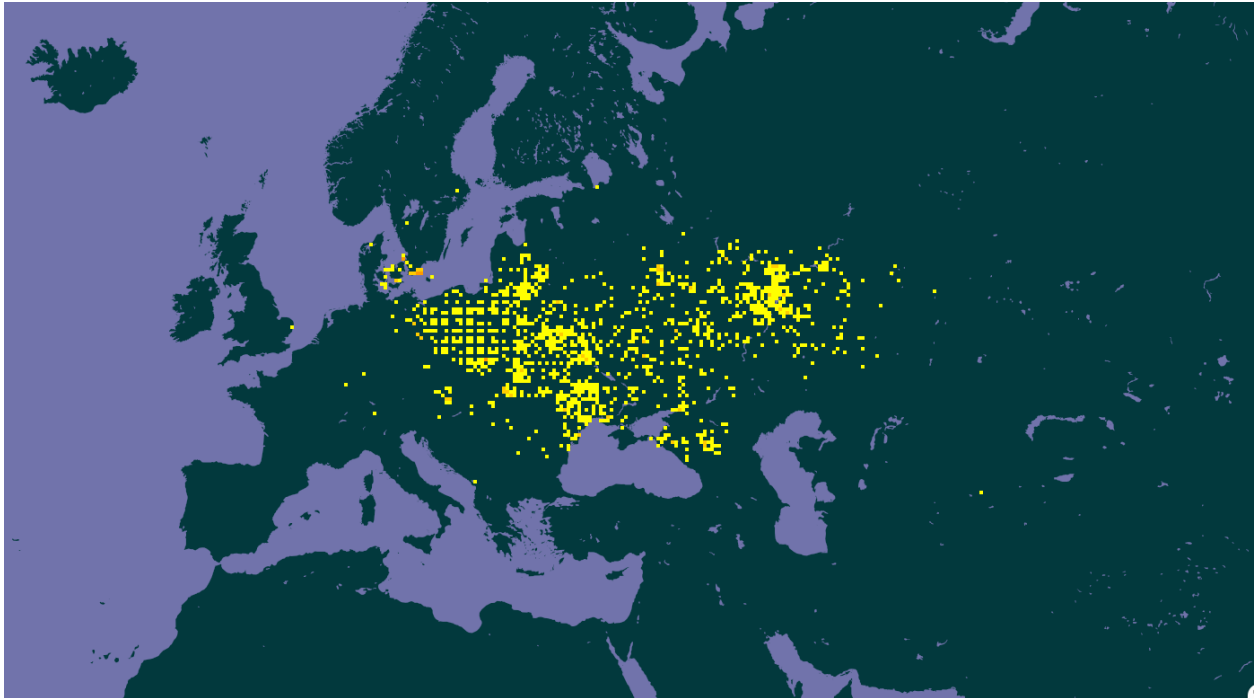


Figure 1. Known global distribution of *Bombina bombina*. Locations are in Albania, Austria, Belarus, Bulgaria, Czechia, Denmark, France, Germany, Hungary, Kazakhstan, Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovenia, Sweden, Switzerland, Ukraine, United Kingdom, and Uzbekistan. Map from GBIF Secretariat (2017).

The location furthest east, in Uzbekistan (Figure 1), is in question by the data provider based on the known distribution of the species (GBIF Secretariat 2017) and was not included as source points for the climate match.

The location in Switzerland (Figure 1) is based on unknown evidence (GBIF Secretariat 2017) and was not included as a source point in the climate match.

The location in France (Figure 1) is based on a human observation and is so far outside the otherwise documented range of the species that is it most likely *Bombina variegata*, a species that has a wide distribution in France (GBIF Secretariat 2017). This observation was not used as a source point for the climate match.



Figure 2. Global distribution of *Bombina bombina*. Range is from Sweden and Latvia south to Turkey, and Denmark and Germany west into Russia and Kazakhstan. Map from Agasyan et al. (2009).

5 Distribution Within the United States

There are no records of *Bombina bombina* in the United States.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Bombina bombina* was high in the Great Lakes, pockets of New England, Appalachia, and the Great Plains. The match was low across the south, Gulf Coast, and west coast; it was medium everywhere else. The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the contiguous United States was 0.496, high, and high in Arizona, Colorado, Connecticut, Idaho, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Mexico, New York, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Dakota, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

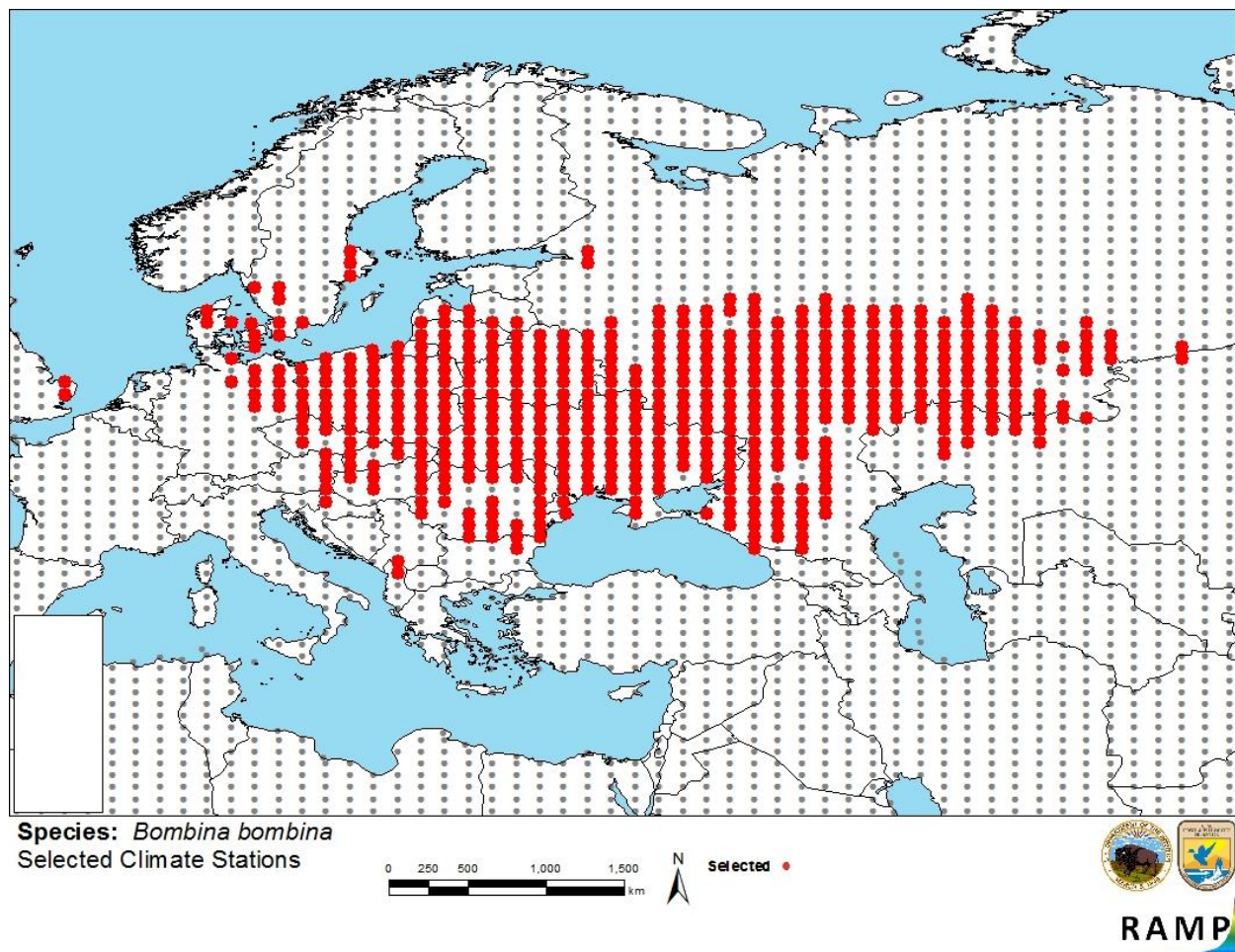


Figure 3. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red; Albania, Austria, Belarus, Bulgaria, Croatia, Czechia, Denmark, Georgia, Germany, Hungary, Kazakhstan, Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovenia, Sweden, Ukraine, United Kingdom) and non-source locations (gray) for *Bombina bombina* climate matching. Source locations from Agasyan et al. (2009) and GBIF Secretariat (2017).

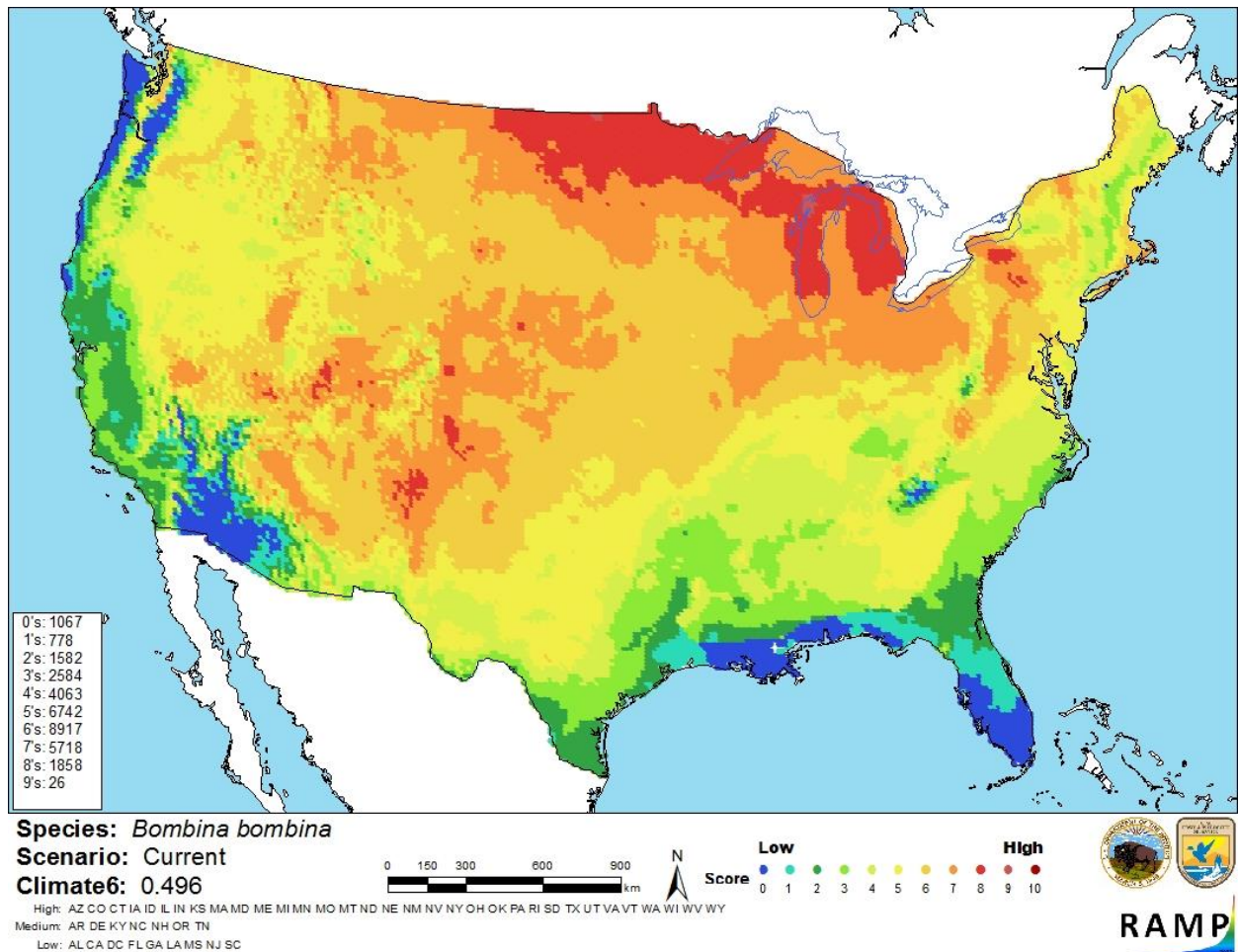


Figure 4. Map of RAMP (Sanders et al. 2014) climate matches for *Bombina bombina* in the contiguous United States based on source locations reported by Agasyan et al. (2009) and GBIF Secretariat (2017). 0 = Lowest match, 10 = Highest match. Counts of climate match scores are tabulated on the left side of the map.

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
$0.000 \leq X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
≥ 0.103	High

7 Certainty of Assessment

The certainty of assessment for *Bombina bombina* is medium. There was adequate ecological and biological information available. One record of introduction was found but no information on any impacts was available.

8 Risk Assessment

Summary of Risk to the Contiguous United States

The history of invasiveness of *Bombina bombina* is not documented. There was one record of introduction and no information any impacts of that introduction. This species is a known carrier of *Batrachochytrium dendrobatidis*, the chytrid fungus, which can cause large scale amphibian declines. This could pose a large risk if the species were to import the fungus with it in a new introduction. The climate match was high, especially in the Great Lakes basin. The certainty of assessment is medium. The overall risk assessment category is uncertain. The risk of another vector and carrier for the chytrid fungus is something to be concerned about but there have been no reported demonstrated impacts from the one known non-native introduction of *Bombina bombina*.

Assessment Elements

- **History of Invasiveness (Sec. 3): Uncertain**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): Medium**
- **Remarks/Important additional information Known carrier of *Batrachochytrium dendrobatidis*.**
- **Overall Risk Assessment Category: Uncertain**

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.

- Agasyan, A., A. Avisi, B. Tuniyev, J. C. Isailovic, P. Lymberakis, C. Andrén, D. Cogalniceanu, J. Wilkinson, N. Ananjeva, N. Üzümlü, N. Orlov, R. Podlousky, S. Tuniyev, and U. Kaya. 2009. *Bombina bombina*. The IUCN Red List of Threatened Species 2009. Available: <http://www.iucnredlist.org/details/full/2865/0>. (April 2016).
- Baláž, V., J. Vörös, P. Civiš, J. Vojar, A. Hettyey, E. Sós, R. Dankovics, R. Jehle, D. G. Christiansen, F. Clare, M. C. Fisher, T. W. J. Garner, and J. Bielby. 2014. Assessing risk and guidance on monitoring of *Batrachochytrium dendrobatidis* in Europe through identification of taxonomic selectivity of infection. *Conservation Biology* 28(1):213–223.
- GBIF Secretariat. 2017. GBIF backbone taxonomy: *Bombina bombina* (Linnaeus, 1761). Global Biodiversity Information Facility, Copenhagen. Available: <http://www.gbif.org/species/2423443>. (March 2017).
- ITIS (Integrated Taxonomic Information System). 2016. *Bombina bombina* (Linnaeus, 1761). Integrated Taxonomic Information System, Reston, Virginia. Available: http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=661625. (April 2016).

Kuzmin, S. L. 2016. *Bombina bombina*. AmphibiaWeb: Information on amphibian biology and conservation. Berkeley, California. Available: <http://amphibiaweb.org/species/2041>. (April 2016).

McAllister, C. T., C. R. Bursey, and P. S. Freed. *Aplectana macintoshii* (Nematoda: Cosmocercidae) from two species of anurans (Bufonidae, Pyxicephalidae) from the Republic of Namibia, southwest Africa. *Comparative Parasitology* 77(1):100–104.

Sanders, S., C. Castiglione, and M. Hoff. 2014. Risk assessment mapping program: RAMP. U.S. Fish and Wildlife Service.

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.

Arnold, E. N. 2003. *Reptiles and amphibians of Europe*. Princeton University Press.

Baker, M. R. 1980. Revision of old world species of the genus *Aplectana* Railliet and Henry, 1916 (Nematoda, Cosmocercidae). *Museum National d'Histoire Naturelle* 2:955–998.

Vojtkova, L. 1976. Nematoda (hlístice) obojživelníků CSSR I. Dosplé hlístice. *Folia Facultatis Scientiarum Naturalium Universitatis Purkynianae Brunensis* 17:5–80.