Amur Pike (*Esox reichertii*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, August 2011
Revised, September 2018
Web Version, 12/18/2018

Photo: Andshel. Licensed under CC BY-SA 3.0. Available: https://commons.wikimedia.org/wiki/Category:Esox_reichertii. (September 2018).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018):

"Asia: Amur drainage [Russia and China] and Sakhalin Island [Russia]; Onon and Kherlen drainages in Mongolia."

From Fricke et al. (2018):

"Russia, China, Mongolia and Sakhalin Island."

Status in the United States

From Meade (1976):

"In 1968, 1969 and 1970 Amur pike eggs were flown here [Pennsylvania] from Russia as part of an international fishery trade agreement. The eggs were hatched and reared both at the Benner Spring Fish Research Station and at the Union City Fish Hatchery. Amur fingerlings were stocked in a four-acre hatchery pond at Benner Spring. Those fish were allowed to grow to maturity and eventually became Pennsylvania's source of brood Amur pike. Each spring, ripe (sexually mature) Amurs are netted from the pond and spawned. The offspring are used for research and for stocking Glendale Lake, in Prince Gallitzin State Park, Cambria County."

"Extra Amur pike x northern pike […] hybrids from the study were stocked in Glendale Lake. Also, in the spring of 1975, when for some reason there was a lack of ripe Amur pike eggs at Benner Spring, additional hybrids were produced using sperm from Amur males and eggs from northern pike females. These hybrids were stocked into Glendale Lake to replace the normal complement of Amur pike which were to have been stocked there."

Fuller (2018b) reports *Esox reichertii* from the Susquehanna and Upper West Branch Susquehanna drainages in Pennsylvania, specifically Glendale Lake. The year of earliest observation was 1956 and the year of last observation was 1991.

From Fuller (2018b):

"Cooper (1983) reported Amur pike as established; however, Robins et al. [1991] listed them as not established. T. Bender (personal communication) believes pure Amur pike are extirpated in Pennsylvania."

"Pure Amur pike were last spawned in 1971. All of the Pennsylvania Fish Commission's brood stock was lost in the summer of 1976 (Bender, personal communication)."

From Fuller (2018a):

"One hundred eighty-six fish [*Esox lucius x E. reichertii*] were intentionally stocked for sport fishing."

"A few hybrids may still exist in Glendale Lake, however none reported for several years (T. Bender, personal communication)."

There is no indication that this species is in trade in the United States.

Means of Introductions in the United States

From Fuller (2018b):

"Intentionally stocked for sport fishing."

Remarks

From Denys et al. (2014):

"While the hybrid *E. lucius* x *masquinongy* is sterile, the hybrid of the two more closely related *E. lucius* x *reichertii* is fertile [Raat 1988].

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2018):

"Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Protacanthopterygii
Order Esociformes
Family Esocidae
Genus *Esox*
Species *Esox reichertii* Dybowski, 1869"

From Fricke et al. (2018):

"Current status: Valid as *Esox reichertii* Dybowski 1869. Esocidae."

Size, Weight, and Age Range

From Froese and Pauly (2018):

"Maturity: Lm 40.0 range ? - ? cm
Max length : 115 cm TL male/unsexed; [Novikov et al. 2002]; common length : 55.0 cm TL male/unsexed; [Novikov et al. 2002]; max. published weight: 20.0 kg [Novikov et al. 2002]"

Environment

From Froese and Pauly (2018):

"Freshwater; demersal;"

Climate/Range

From Froese and Pauly (2018):

"Temperate; 55°N - 43°N"

Distribution Outside the United States

Native

From Froese and Pauly (2018):

"Asia: Amur drainage [Russia and China] and Sakhalin Island [Russia]; Onon and Kherlen drainages in Mongolia."

From Fricke et al. (2018):

"Russia, China, Mongolia and Sakhalin Island."

Introduced

No information available. GBIF Secretariat (2018) shows occurrences of this species in Germany and Switzerland; however, no further information is available to determine if these are actually legitimate, established occurrences of *Esox reichertii*.

Means of Introduction Outside the United States

No information available.

Short Description

No information available.

Biology

From Froese and Pauly (2018):

"Feeds on fish of no commercial or angling importance [Dulmaa 1999]. Oviparous [Breder and Rosen 1966]."

Human Uses

From Froese and Pauly (2018):

"Fisheries: commercial; gamefish: yes"

Diseases

From Kuchta et al. (2007):

"Tapeworms of the genus *Triaenophorus* Rudolphi, 1793 (Cestoda: Pseudophyllidea) are frequent parasites of common pike (*Esox lucius* L.), Amur pike (*E. reichertii* Dybowski) and walleye [*Sander vitreus* (Mitchill)], distributed circumboreally (Kuperman 1973, Schmidt 1986, Bray et al. 1994)."

Kuchta et al. (2007) report *T. amurensis* and *T. orientalis* from *Esox reichertii* in the Amur River.

No OIE-reportable diseases have been documented for this species.

Threat to Humans

From Froese and Pauly (2018):

"Harmless"

3 Impacts of Introductions

From Fuller (2018b):

"The impacts of this species are currently unknown, as no studies have been done to determine how it has affected ecosystems in the invaded range [Pennsylvania]. The absence of data does not equate to lack of effects. It does, however, mean that research is required to evaluate effects before conclusions can be made."

4 Global Distribution

Figure 1. Known global distribution of *Esox reichertii*, reported from Russia, Germany, and Switzerland. Map from GBIF Secretariat (2018). Georeferenced occurrences representing the distribution in Mongolia, China, and Sakhalin Island (Russia) were not available, and are not included in the climate matching analysis below. Points in Europe appear to be legitimate; however, because no information is available documenting introductions of this species in Europe, they were not included in climate matching.

5 Distribution Within the United States

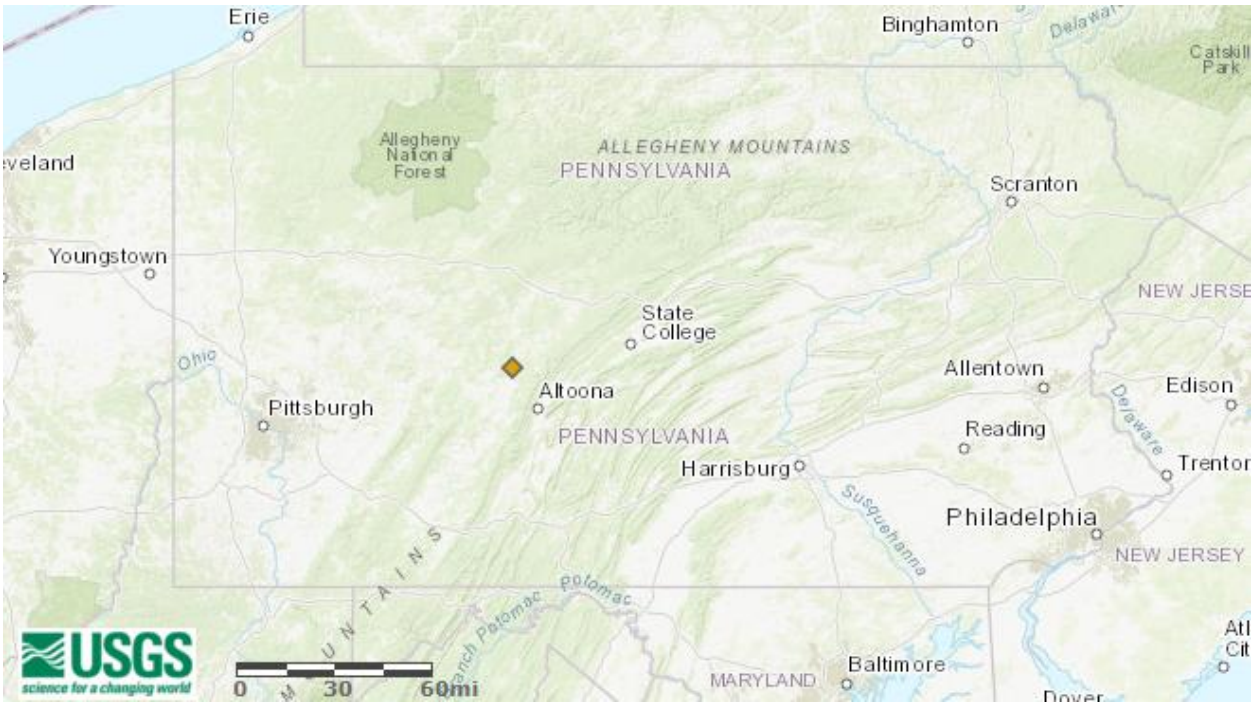

Figure 2. Known distribution of *Esox reichertii* in the United States. Map from Fuller (2018b). This point represents the location where both pure *E. reichertii* and hybrid *E. lucius x E. reichertii* were stocked in Pennsylvania. Because *E. reichertii* introduced at this location were apparently extirpated, this location was not included in the climate matching analysis.

6 Climate Matching

Summary of Climate Matching Analysis

The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the contiguous United States was 0.142, which is a high climate match. A Climate 6 score of 0.103 or greater indicates a high match. The climate match was high in the far northern Midwest, with medium climate matches in northern Maine, the western Midwest, and much of the northern Plains. Remaining areas of the contiguous United States were low climate matches. Iowa, Minnesota, Montana, North Dakota, Nebraska, South Dakota, and Wisconsin had a high climate scores. The climate score was medium in Colorado, Michigan, New Mexico, and Wyoming. In all other states, the climate score was low.

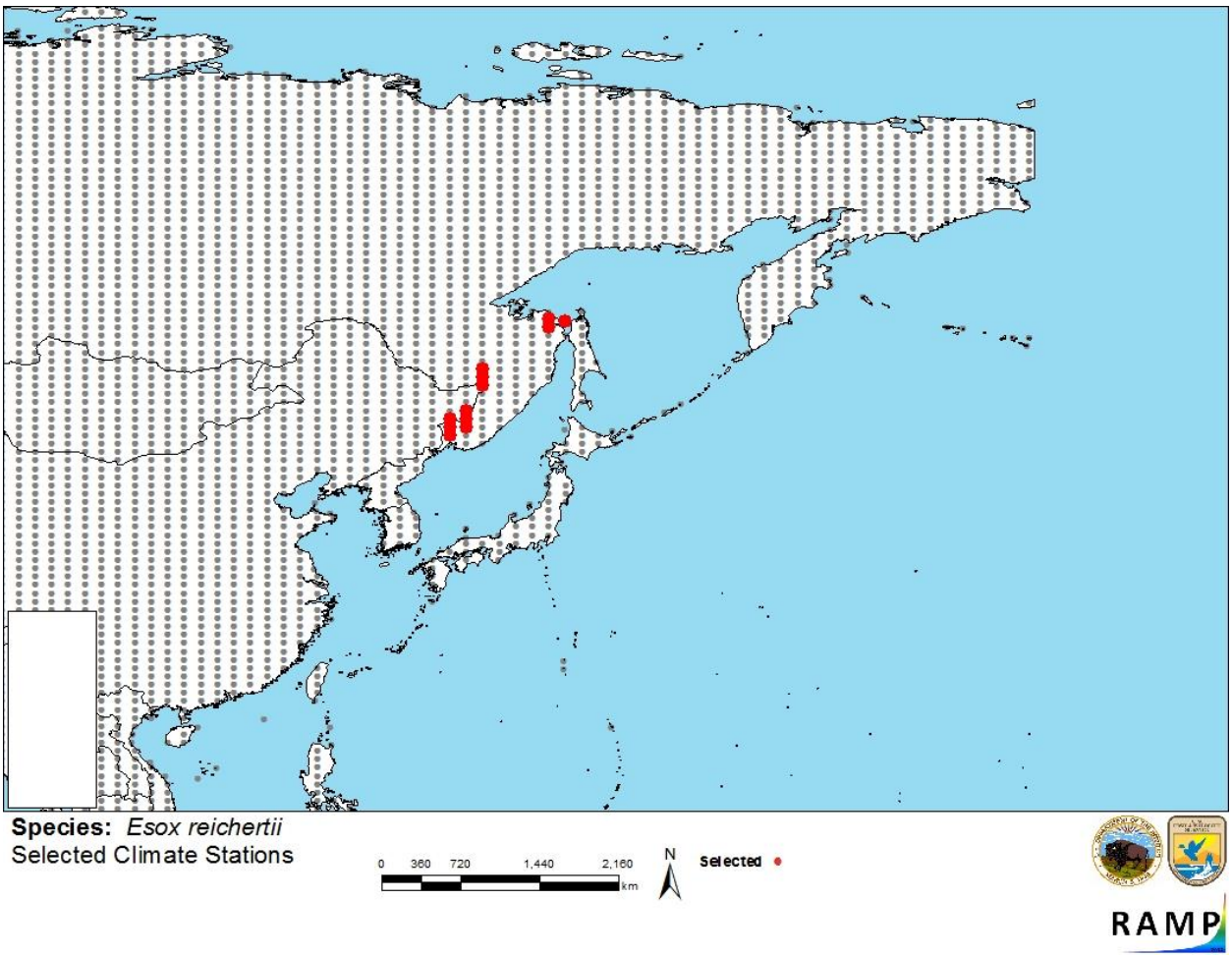

Figure 3. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red; China, Russia) and non-source locations (gray) for *Esox reichertii* climate matching. Source locations from GBIF Secretariat (2018). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

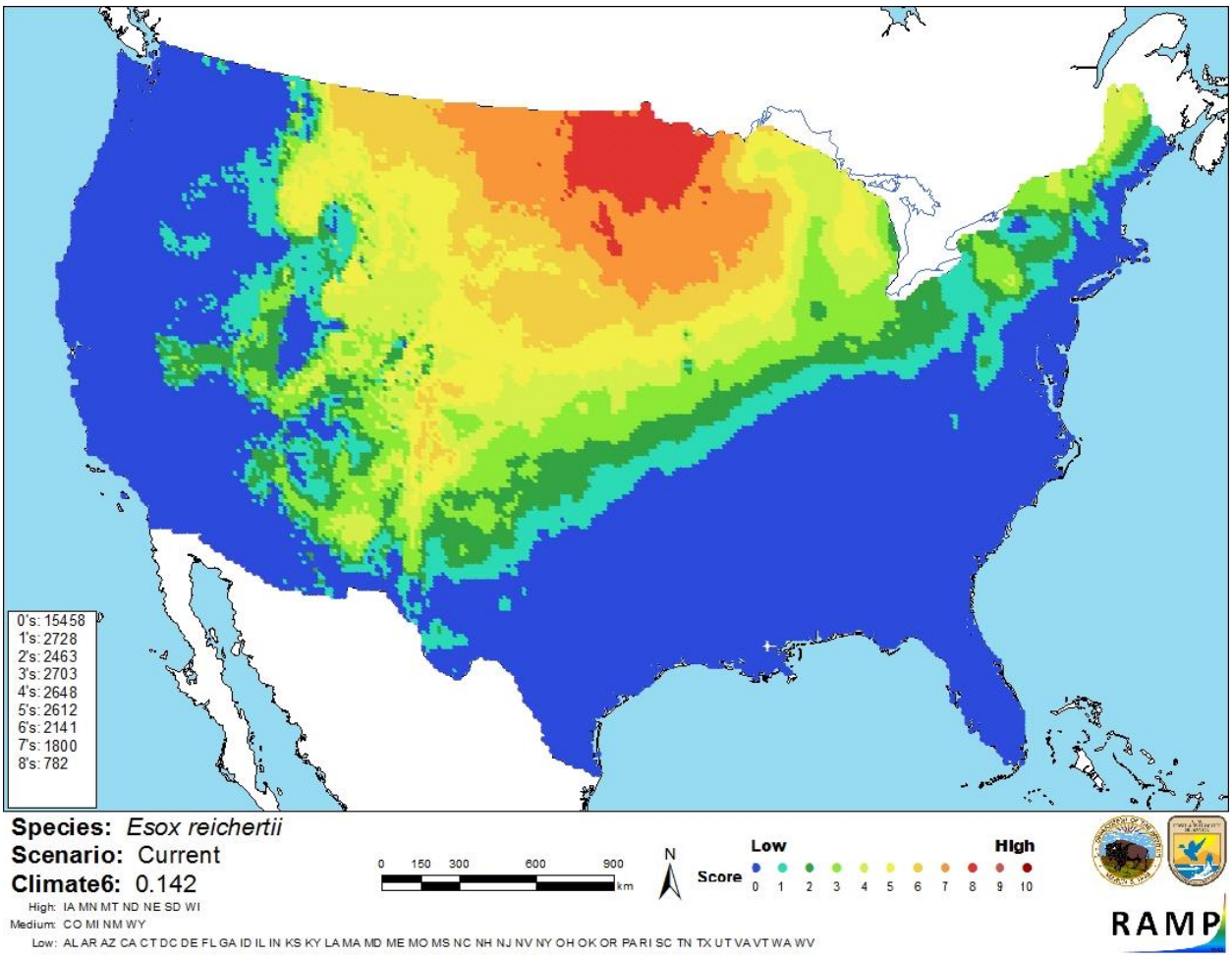

Figure 4. Map of RAMP (Sanders et al. 2014) climate matches for *Esox reichertii* in the contiguous United States based on source locations reported by GBIF Secretariat (2018). 0= Lowest match, 10=Highest match.

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

There is limited information available about the biology of *Esox reichertii*. This species has been introduced to the United States through stocking in a single lake, but the population failed to establish, and no research is available investigating negative impacts of its introduction. No other introductions of *E. reichertii* have been documented. However, GBIF Secretariat (2018) reports live observations in Germany and Switzerland with no further information, so it is unclear

whether these observations are credible occurrences of *E. reichertii* in the wild. Certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Esox reichertii, the Amur Pike, is a freshwater fish species native to the Amur River drainage in Russia and China, Sakhalin Island in Russia, and the Onon and Kherlen drainages in Mongolia. This species is used as a game and commercial fish for human consumption. *E. reichertii* was stocked in Pennsylvania for sport fishing, but the population failed. Hybrids of *E. reichertii* and the Northern Pike, *E. lucius*, were also stocked in Pennsylvania, and are most likely extirpated as well. No information is available on negative impacts of these introductions. No other introductions have been confirmed. *E. reichertii* has a high climate match with the contiguous United States. The area of highest match was located in the northern Midwest and upper Great Plains. Certainty of this assessment is low because of the lack of information from which to base an assessment of the invasive potential of this species. The overall risk assessment category is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): Uncertain**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): Low**
- **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.

Denys, G. P. J., A. Dettai, H. Persat, M. Hautecœur, and P. Keith. 2014. Morphological and molecular evidence of three species of pikes *Esox* spp. (Actinopterygii, Esocidae) in France, including the description of a new species. Comptes Rendus Biologies 337(9):521-534.

Fricke, R., W. N. Eschmeyer, and R. van der Laan, editors. 2018. Catalog of fishes: genera, species, references. Available: http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp. (September 2018).

Froese, R., and D. Pauly, editors. 2018. *Esox reichertii* (Dybowski, 1869). FishBase. Available: https://www.fishbase.de/summary/Esox-reichertii.html. (September 2018).

Fuller, P. 2018a. *Esox lucius x E. reichertii*. U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, Florida. Available: https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=678. (September 2018).

Fuller, P. 2018b. *Esox reichertii* Dybowski, 1869. U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, Florida. Available: https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=682. (September 2018).

GBIF Secretariat. 2018. GBIF backbone taxonomy: *Esox reichertii*, Dybowski, 1869. Global Biodiversity Information Facility, Copenhagen. Available https://www.gbif.org/species/2346630:. (September 2018).

ITIS (Integrated Taxonomic Information System). 2018. *Esox reichertii* (Dybowski, 1869). Integrated Taxonomic Information System, Reston, Virginia. Available: https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=623349#null. (September 2018).

Kuchta, R., R. Vlcková, L. G. Poddubnaya, and A. Gustinelli. 2007. Invalidity of three Palaearctic species of *Triaenophorus* tapeworms (Cestoda: Pseudophyllidea): evidence from morphometric analysis of scolex hooks. Folia Parasitologica 54:34-42.

Meade, J. W. 1976. Meet the Amur pike. Pennsylvania Angler 45(5):8-11.

Sanders, S., C. Castiglione, and M. H. 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.

Bray R. A., A. Jones, and K. I. Andersen. 1994. Order Pseudophyllidea Carus, 1863. Pages 205-247 *in* L. F. Khalil, A. Jones, and R. A. Bray, editors. Keys to the Cestode parasites of vertebrates. CAB International, Wallingford, U.K.

Breder, C. M., and D. E. Rosen. 1966. Modes of reproduction in fishes. T. F. H. Publications, Neptune City, New Jersey.

Cooper, E. L. 1983. Fishes of Pennsylvania. Pennsylvania State University Press, University Park, PA.

Dulmaa, A. 1999. Fish and fisheries in Mongolia. Pages 187-236 *in* T. Petr, editor. Fish and fisheries at higher altitudes: Asia. FAO Fisheries Technical Paper 385. FAO, Rome.

Kuperman, B. I. 1973. Tapeworms of the genus *Triaenophorus*, parasites of fish. Experimental systematics, ecology. Nauka, Leningrad, Russia. (In Russian.)

Novikov, N. P., A. S. Sokolovsky, T. G. Sokolovskaya and Y. M. Yakovlev. 2002. The fishes of Primorye. Far Eastern State Technical Fisheries University, Vladivostok, Russia.

Raat, A. J. P. 1988. Synopsis of biological data on the northern pike *Esox lucius* Linnaeus, 1758. FAO Fisheries Synopsis 30. Food and Agriculture Organization of the United Nations, Rome.

Robins, C. R., R. M. Bailey, C. E. Bond, J. R. Brooker, E. A. Lachner, R. N. Lea, and W. B. Scott. 1991. World fishes important to North Americans exclusive of species from the continental waters of the United States and Canada. American Fisheries Society Special Publication 21. American Fisheries Society, Bethesda, MD.

Schmidt, G. D. 1986. CRC handbook of tapeworm identification. CRC Press, Boca Raton, Florida.