

Spiny-Cheek Crayfish (*Orconectes limosus*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, April 2014

Revised, June 2015



Photo: © A. Berger, from EOL (2014).

1 Native Range, and Status in the United States

Native Range

From Adams et al. (2010):

“Canada (New Brunswick, Québec); United States (Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia)”

Status in the United States

From Adams et al. (2010):

“This species is widespread in North America occurring in the Atlantic watershed in Connecticut, District of Columbia, Delaware, Massachusetts, Maryland, Maine, New Brunswick,

New Hampshire, New Jersey, New York, Pennsylvania, Québec, Rhode Island, Virginia, Vermont and West Virginia (Fetzner 2008, Hobbs 1974, Jezerinac et al. 1995, Souty-Grosset et al. 2006).”

Means of Introductions in the United States

This species has not been reported as introduced outside its native range in the United States.

Remarks

From Adams et al. (2010):

“The Extent of Occurrence (EOO) of this species has been estimated to exceed 2 million km².”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2014):

“Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Protostomia
Superphylum Ecdysozoa
Phylum Arthropoda
Subphylum Crustacea
Class Malacostraca
Subclass Eumalacostraca
Superorder Eucarida
Order Decapoda
Suborder Pleocyemata
Infraorder Astacidea
Superfamily Astacoidea
Family Cambaridae
Subfamily Cambarinae
Genus *Orconectes*
Subgenus *Orconectes* (Faxonius)
Species *Orconectes limosus*

Taxonomic Status: Valid”

Size, Weight, and Age Range

From Aldridge (2011):

“Spiny-cheek crayfish are a small to medium sized crayfish species, the largest specimens reaching just over 11cm long.”

“Average life span is 2 years, although some live up to 4 years.”

Environment

From Aldridge (2011):

“Spiny-cheek crayfish are found in rivers, wide streams (*sic*), ponds and lakes, and prefer calm and turbid waters to fast flowing.”

Climate/Range

From Aldridge (2011):

“Adults are tolerant of low temperatures, dry conditions and water pollution.”

Distribution Outside the United States

Native

From Adams et al. (2010):

“Canada (New Brunswick, Québec)”

Introduced

From Adams et al. (2010):

“Austria; Belgium; Czech Republic; France (France (mainland)); Germany; Hungary; Italy (Italy (mainland)); Lithuania; Luxembourg; Montenegro; Morocco; Netherlands; Poland; Russian Federation (Kaliningrad); Switzerland; United Kingdom (Great Britain)”

Means of Introduction Outside the United States

From Adams et al. (2010):

“This species was originally introduced into Europe to replace diminished populations of the Signal Crayfish, but due to its small size that replacement failed [Holdich and Black 2007].”

From Aldridge (2011):

“Deliberate introduction by anglers for fish food or bait has allowed spiny-cheek crayfish to colonise new and disparate sites in the UK”

Short description

From Aldridge (2011):

“They have distinctive spiny cheeks, legs with orange tips and striped abdomens, but are often coloured black from the sediment they live in.”

Biology

From Adams et al. (2010):

“This species inhabits clear streams that are 10 - 100 m wide, with silt, cobble, gravel and sand substrates (Jezerinac [et al.] 1995, Aiken 1965). This species has also been found in lakes (Aiken 1965). Individuals are often found in shallow depressions in pools and have rarely been captured where silt is absent from the substrate (Jezerinac [et al.] 1995).”

From Aldridge (2011):

“Omnivore”

“High fecundity, rapid maturation and reproduction give spiny-cheek crayfish high invasive potential. They mate in the spring and females lay up to 372 eggs (average 138) in April/May. They carry their eggs for 1-3 weeks, before hatching in May or June. A second mating period is sometimes observed in autumn, which allows sperm to be stored to produce young in early spring. The young mature in their second summer.”

“Large fish, such as carp, may eat the spiny-cheek crayfish. Coots have been observed attacking crayfish and it is likely that herons, cormorants and wildfowl may also predate them.”

From Buřič et al. (2011):

“Females of one cambarid species particularly widespread in Europe, the spiny-cheek crayfish *Orconectes limosus*, are capable of facultative parthenogenesis.”

Human uses

From Holdich and Black (2007):

“Due to the fact that it does not live for long, i.e. usually less than four years, has small chelipeds with little meat, and rarely reaches the preferred size for commercial use, i.e. 10 cm total length, it never fulfilled its role as a replacement for *A. astacus* from the gastronomic point of view in Europe”

“It is commonly used as fish bait and as fish food”

“aquarium pets”

Diseases

From Corbel et al. (2001):

“Eight European marine and freshwater crustaceans were experimentally infected with diluted shrimp haemolymph infected with white spot syndrome virus (WSSV). ... High mortality rates were noted between 7 to 21 days post-infection for *Liocarcinus depurator*, *Liocarcinus puber*,

Cancer pagurus, *Astacus leptodactylus*, *Orconectes limosus*, *Palaemon adspersus* and *Scyllarus arctus*.”

From Holdich and Black (2007):

“*O. limosus* acts as a vector of crayfish plague (Vey et al. 1983)”

Crayfish plague and white spot disease are OIE-reportable diseases.

From Longshaw (2011):

“Declines of the spiny-cheek crayfish *Orconectes limosus* in Germany were associated with several *Saprolegnia* spp., found both on external surfaces and more deeply within abdominal tissues (Hirsch et al., 2008).”

“The first *Thelohania* to be described from a crayfish was *Thelohania contejeani* Henneguy, 1892 and has been extensively studied. The parasite caused mass mortalities of crayfish in Europe; it infects *A. astacus*, *A. leptodactylus*, *A. pallipes*, *P. leniusculus* and *Orconectes (Faxonius) limosus* (Dunn et al., 2009; Edgerton et al., [2002]).”

Threat to humans

From Aldridge (2011):

“Health and Social Impact: None known.

Economic Impact: Burrowing by crayfish may destabilise river banks causing damage to buildings or endangering livestock grazing nearby.”

3 Impacts of Introductions

From Lucić (2012):

“The present study demonstrated that invasive crayfish had better condition indices when compared to native species, as the energy content of hepatopancreas, abdominal muscle and gonads was almost always higher in invasive than in native species.”

From Pârvulescu et al. (2012):

“Our study clearly showed that *Orconectes limosus* is rapidly spreading downstream in the Romanian stretch of the Danube, and that its populations are infected by the crayfish plague pathogen *Aphanomyces astaci*. We also demonstrated that *A. astaci* had been transferred to local populations of the native narrow-clawed crayfish *Astacus leptodactylus*, which strongly declined in coexistence with *O. limosus*. Furthermore, the pathogen was detected in an *A. leptodactylus* population well in advance of the main invasion front of the invasive species.”

From Hirsch and Fischer (2008):

“We tested the effects of the invasive spinycheek crayfish (*Orconectes limosus*) on native young-of-the-year (YOY) and adult burbot (*Lota lota*) in Lake Constance. Spinycheek crayfish successfully repelled YOY burbot from their preferred daytime shelters into alternative, previously unselected shelters. Crayfish also affected the nocturnal behaviour of YOY burbot by eliciting avoidance behaviour and caused an increase in the plasma cortisol levels.”

4 Global Distribution

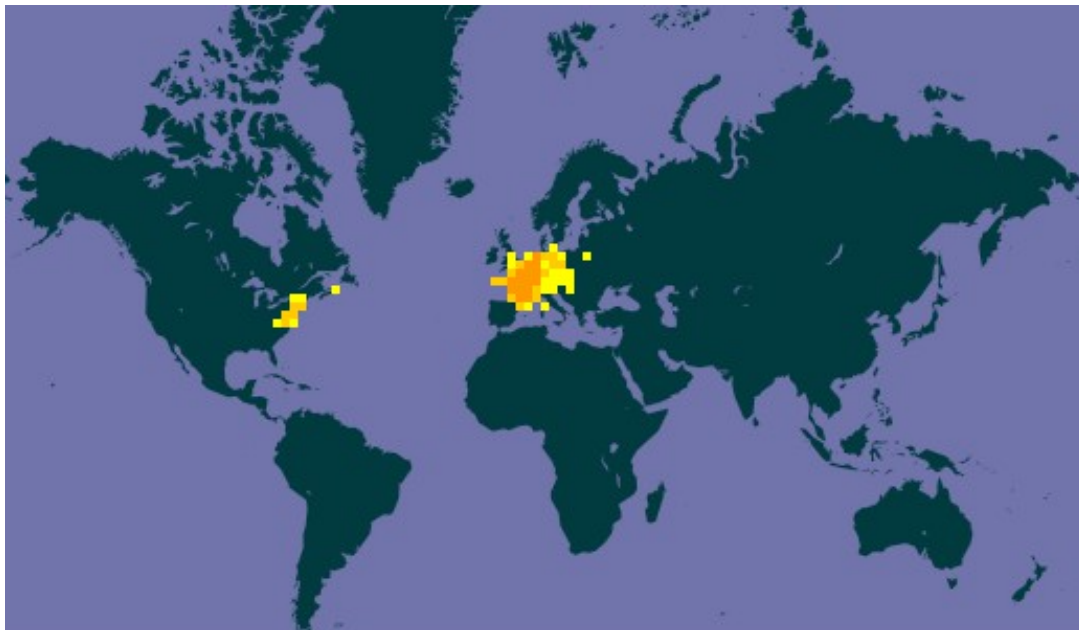


Figure 1. Map of known global distribution of *Orconectes limosus*. Map from GBIF (2015).

5 Distribution within the United States



Figure 2. *Left:* Map of known US distribution of *Orconectes limosus*. Map from GBIF (2015). *Right:* Map of native range of *O. limosus*. © K. A. Crandall. Licensed under CC BY-NC-SA 3.0. Available: <http://creativecommons.org/licenses/by-nc-sa/3.0/>.

6 Climate Match

Summary of Climate Matching Analysis

The climate match (Sanders et al. 2014; 16 climate variables; Euclidean Distance) was high in the Northeast, Great Lakes, Ohio River Valley and portions of the Ozarks. Isolated patches of high match can be found along the southern California coast, the coast of Washington, eastern Texas, and in the Interior West. Highest match was in the New England, Great Lakes, and Mid-Atlantic states. Climate 6 match indicated that the Continental U.S. has a high climate match. The range for a high climate match is 0.103 and greater; climate match of *Orconectes limosus* is 0.298.

Crayfishes have been observed to establish populations in climates different from that found within their native range (M. Hoff, U.S. Fish and Wildlife Service, personal communication). The climate match shown here may be an underestimate of climate suitability for the establishment of *O. limosus*.

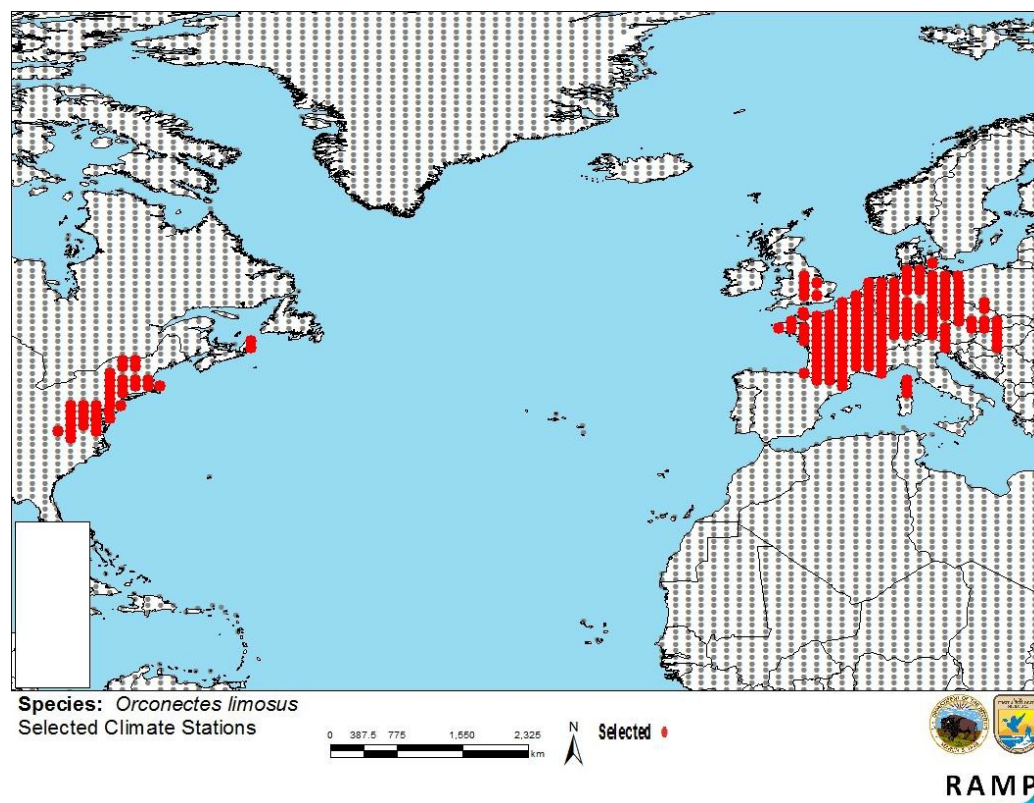


Figure 3. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (gray) for *Orconectes limosus* climate matching. Source locations from GBIF (2015).

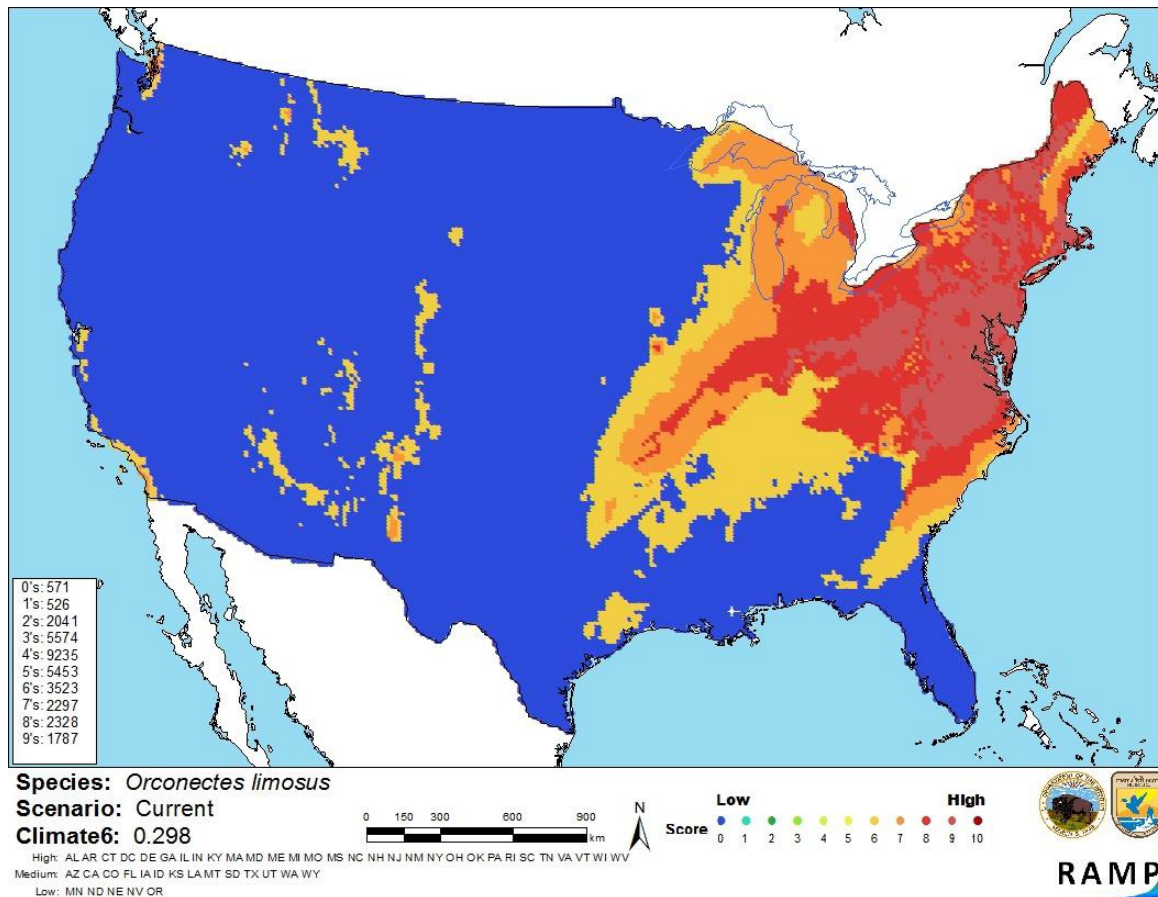


Figure 4. Map of RAMP (Sanders et al. 2014) climate matches for *Orconectes limosus* in the continental United States based on source locations reported by GBIF (2015). 0= Lowest match, 10=Highest match.

7 Certainty of Assessment

The biology and ecology of *O. limosus* have been studied. Information on the impacts of introduction of this species is readily available. However, studies of impacts have been focused in Europe and one of the main impacts is the introduction of crayfish plague, to which native European crayfish are susceptible while North American crayfish are carriers. Certainty of assessment for this species is medium.

8 Risk Assessment

Summary of Risk to the Continental United States

O. limosus is a freshwater crayfish native to the northeastern United States. This species has established itself in Europe where it is rapidly spreading and considered an invasive species. It has reportedly had significant impact on the native crayfish where introduced, as well as on at least one fish species. It is a carrier of the crayfish plague and susceptible to white spot disease, and it can reproduce by parthenogenesis. Climate match with the United States is high, with much of the United States east of the Mississippi River predicted to be good habitat for this species. Overall risk posed by this species is high.

Assessment Elements

- ☐ **History of Invasiveness (Sec. 3):** High
- ☐ **Climate Match (Sec.6):** High
- ☐ **Certainty of Assessment (Sec. 7):** Medium
- ☐ **Remarks/Important additional information:** Parthenogenic.
- ☐ **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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- Sanders, S., C. Castiglione, and M. Hoff. 2014. Risk Assessment Mapping Program: RAMP. US 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.

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