Orconectes virilis 正體中文

System: Freshwater

Kingdom	Phylum	Class	Order	Family
Animalia	Arthropoda	Malacostraca	Decapoda	Cambaridae

Common name northern crayfish (English), virile crayfish (English)

Synonym

Similar species *Orconectes immunis, Astacidea, Orconectes limosus, Orconectes punctimanus*

Summary *Orconectes virilis* is a crayfish native to the Missouri, Mississippi, Ohio, and Great Lakes drainages of the United States. It has become introduced to locations throughout the United States through live pet and bait trade and has also established in a few locations in Europe. Its important impacts to introduced systems include competition with and displacement of native fish and crayfish and the reduction of snail, macroinvertebrate, and macrophyte abundance and biodiversity.

view this species on IUCN Red List

Species Description
Orconectes virilis is reddish-brown to olive-brown in color. Adults reach about 13 cm long with males typically growing larger than females. It has bumps on the medial side of its carapace and along its chelae. Chelae also often have dark specs and orange or reddish tips. *O. virilis* may also have paired black marks along its abdomen (ANSIS, 2007).

Lifecycle Stages
The maximum lifespan of *Orconectes virilis* is 3 years. They undergo several molts in their first few months. *O. virilis* typically reaches a length of 23-56 mm in first year and a length of 58-84 mm by the second. They reach maturity during their second summer usually around 24mm.(ANSIS, 2007). *O. virilis* undergoes form alternation between the sexually mature Form I during the mating season and the sexually immature Form II outside of the mating season (Matthews *et al*, 2008).

Uses
Orconectes virilis is a popularly consumed food in the United States and increasingly more so in Europe (Collicut, undated). *O. virilis* a commonly used fish bait and is sold as such in bait shops. It is also sold commercially in the pet trade as pets or prey for predaceous aquarium fishes (Hunner, 1997). Beginning in approximately 1950 *O, virilis* was stocked as a biological control in the Colorado River watershed of western New Mexico and northeastern Arizona, primarily for vegetation control (Johnson, 1986).

Habitat Description
Orconectes virilis may inhabit rivers, streams, lakes, marshes and ponds that are permanent and well oxygenated (Collicut, 1998). They prefer warm waters of moderate turbidity with cobble or rocky substrates and abundant logs, rocks, vegetation, and other debris to use as cover. They are also known to dig pits in river banks and under rocks when water levels are low (ANSIS, 2007; Benson, 2010). *O. virilis* can survive a temperature range of 0-32°C and has a preferred temperature range of 24-25°C. Its movement is halted at temperatures below 10°C. It is unable to withstand acidic conditions and prefer locations with a pH of over 5.37. *O. virilis* is also untolerant of poor water quality and high salinity (ANSIS, 2007).

Reproduction
Breeding of *Orconectes virilis* begins in the fall to early spring and extends until the adults retreat to deep water and become inactive. Breeding sometimes occurs for a brief period in the spring when the water begins warming (Collicut, 1998; ANSIS, 2007). Females store sperm for up to months and fertilize their eggs in the spring. Eggs are attached to swimmerets in a large ball resembling a raspberry. The eggs hatch one to two months after they are laid. Young hatchlings look like miniature adults and can probably grow to about 2-3cm long by the fall. (Collicut, 1998).

Nutrition
Orconectes virilis is omnivorous and consumes a variety of live and dead animal and plant material (ANSIS, 2007). It is known to consume macroinvertebrates such as snails and insects, as well as, small fish, fish eggs, tadpoles, and macrophytes. *O. virilis* is believed to obtain most of its nutrition by scavenging dead animals (Collicut, 1998).

General Impacts
Orconectes virilis may have a variety of impacts on introduced ecosystems that include direct and indirect impacts on habitat, competition with and displacement of native species, and other ecological interactions. *O. virilis* is known to alter and reduce macrophyte biomass and diversity (Chambers *et al*, 1990; Davidson *et al*, 2010; Olden *et al*, 2009). It may displace native crayfish as in the case of the endangered *Pacifastacus nigrescens* in California (Light *et al*, 1995); *Orconectes obscurus* and *Cambarus bartonii* in North Carolina (Cooper *et al*, 1998); and *Orconectes limosus* and *Cambarus bartonii bartonii* in Maryland (USA) (Schwartz *et al*, 1963). Field and laboratoy observations indicate that is may compete with and/or cause the decline of native fish species such as juvenile desert suckers (*Catostomus clarkii*), the Sonora sucker (*Catostomus insignis*), and the federally threatened Little Colorado spinedace (*Lepidomeda vittata*) in Arizona (Davidson *et al*, 2010; Bryan *et al*, 2002); the flannelmouth sucker (*Catostomus latipinnis*) in Colorado (Carpenter, 2005); and the White Sands pupfish (*Cyprinodon tularosa*) in New Mexico (Rogowski & Stockwell, 2006). It has been reported to contribute to the decline of the Chiricahua leopard frog (*Rana chiricahuensis*) in Arizona (Davidson *et al*, 2010). *O. virilis* is also known to cause the decline of native snails (ANSIS, 2007), as in the case of three forks spring snail (*Pyrgulopsis trivialis*) in Arizona (Davidson *et al*, 2010) and Canadian native snails *Stagnicola elodes* and *Physa gyrina* in laboratory studies (Hanson *et al*, 1990).
Additional impacts associated with *O. virilis* include the reduction of insects and other macroinvertebrates (Davidson *et al*, 2010; Hanson *et al*, 1990), the alteration of the structure and composition of littoral zones (Chambers *et al*, 1990), the increase in turbidity of waters (Davidson *et al*, 2010), and impacts to irrigation networks and levees as a result of their burrowing near head gates and weir boxes (Godfrey, 2002).

Management Info
Preventative measures: Education of the public, especially, pet traders, anglers, and bait shop owners, of the negative impacts of *Orconectes virilis* and the dangers associated with releasing nonnative crayfish may help reduce their introductions to new locations (ANSIS, 2007).
To minimize effects to irrigation systems in rice fields, the fields may be drained temporarily to drive crayfish in to their burrows so rice seedlings may establish (Godfrey, 2002).
Biological control: The protection of sport fish and regulations that reduce their harvest in order to increase predation on *Orconectes virilis* is one potential means of reducing its populations (ANSIS, 2007).
A bacteria and the White Spot Syndrome Virus were examined for their effectiveness as potential biological controls for *Orconectes virilis*. The bacteria *Spiroplama penaeiled* led to 100% mortality when injected but body parts injected with *S. penaeiled* and fed to *O. virilis* did not induce mortality indicating that transmission via cannibalistic feeding is not viable. The White Spot Syndrome Virus yielded 100% mortality when injected or fed to all sizes of *O. virilis* indicating that it may be spread through cannibalistic feeding. WSSV did not infect non-target invertebrates but further research into this virus as well as other potential biological control agents for *O. virilis* is required before a viable one is found (Davidson *et al*, 2010).

Pathway
Orconectes virilis is commonly used as fishing bait and commonly sold in bait shops. Many of their introductions have been attributed to their use as such.*Orconectes virilis* may be introduced to new locations via aquarium trade (Filipova *et al* 2009).

Principal source: Aquatic Nusiance Species Information System (ANSIS), 2007. Species Profiles: - Northern Crayfish
Davidson, Elizabeth W.; Jennifer Snyder; Donald Lightner; Gregory Ruthig; Julie Lucas; Joel Gilley, 2010. Exploration of potential microbial control agents for the invasive crayfish, Orconectes virilis. Biocontrol Science and Technology, 1360-0478, Volume 20, Issue 3, 2010, Pages 297 – 310
Biology of Northern Crayfish (Collicut, 1998)

Compiler: National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

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ALIEN RANGE

[1] CANADA
[1] SWEDEN
[22] UNITED STATES
[1] NETHERLANDS
[1] UNITED KINGDOM

Red List assessed species 9: CR = 1; EN = 1; VU = 4; DD = 1; LC = 2;

Austropotamobius pallipes **EN**
Catostomus clarkii **LC**
Cyprinodon tularosa **VU**
Orconectes wrighti **VU**
Pyrgulopsis trivialis **DD**
Cambarus elkensis **VU**
Catostomus insignis **LC**
Lithobates chiricahuensis **VU**
Pacifastacus fortis **CR**

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Managment information

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Centre for Environment, Fisheries & Aquaculture Science (CEFAS)., 2008. Decision support tools-Identifying potentially invasive non-native marine and freshwater species: fish, invertebrates, amphibians.
Summary: The electronic tool kits made available on the Cefas page for free download are Crown Copyright (2007-2008). As such, these are freeware and may be freely distributed provided this notice is retained. No warranty, expressed or implied, is made and users should satisfy themselves as to the applicability of the results in any given circumstance. Toolkits available include 1) FISK- Freshwater Fish Invasiveness Scoring Kit (English and Spanish language version); 2) MFISK- Marine Fish Invasiveness Scoring Kit; 3) MI-ISK- Marine invertebrate Invasiveness Scoring Kit; 4) FI-ISK- Freshwater Invertebrate Invasiveness Scoring Kit and AmphISK- Amphibian Invasiveness Scoring Kit. These tool kits were developed by Cefas, with new VisualBasic and computational programming by Lorenzo Vilizzi, David Cooper, Andy South and Gordon H. Copp, based on VisualBasic code in the original Weed Risk Assessment (WRA) tool kit of P.C. Pheloung, P.A. Williams & S.R. Halloy (1999).
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The guidance document is available from http://www.cefas.co.uk/media/118009/fisk_guide_v2.pdf [Accessed 13 January 2009].
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Invasive species - crustaceans is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Crust%C3%A1ceos [Accessed 30 July 2008]
Spanish:
La lista de especies del Sistema de informacin sobre especies invasoras de mxico cuenta actualmente con informacin aceca de nombre cientfico, familia, grupo y nombre comn, as como hbitat, estado de la invasin en Mxico, rutas de introduccin y ligas a otros sitios especializados. Algunas de las especies de mayor riesgo ya tienen una liga directa a la pgina de alertas. Es importante resaltar que estas listas se encuentran en constante proceso de actualizacin, por favor consulte la portada (http://www.conabio.gob.mx/invasoras/index.php/Portada), en la seccin novedades, para conocer los cambios.
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