Daphnia lumholtzi **System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Arthropoda	Branchiopoda	Diplostraca	

Common name water flea (English)

Synonym

Similar species

Summary Daphnia lumholtzi is a cladoceran commonly referred to as a water flea. It is type of zooplankton that serves as an important food source for larval and juvenile fish. It is invading reservoirs and lakes across North America and it is feared that this species may have a detrimental effect on fish that depend on zooplankton in their larval and juvenile stage. It is also feared that Daphnia lumholtzi will replace native Daphnia and cause a shift in pelagic communities of both zooplankton and fish.

view this species on IUCN Red List

Species Description
The most distinguishing characteristics of *D. lumholtzi* is its long helmet and tail spines. Its anterior helmet is larger than that produced by any native species, although similar in form.The tailspine is normally at least as long as the body length. Native species have a tail that is much shorter than its overall body length. Other distinct characteristics are the fornices that extend to a sharp point instead of being smooth and rounded like native Daphnia. The ventral carapace margin has approximately 10 prominent spines while native species have weak spinescence (Benson *et al.* 2004; Harvel and Herbert, 1993).

Notes
Cladocerans, also known as water fleas, are a type of zooplankton that are nearly invisible to the naked eye. Despite their small size, they are an important food source for larval and early juvenile stages of nearly every species of North American fish (Stoeckel and Charlebois, 1999).

Habitat Description
D. lumholtzi is native to tropical and subtropical regions in Africa, Asia, and Australia. It inhabits reservoirs, river oxbows (''billibongs''), and deep tectonic lakes. Most water bodies invaded by *D. lumholtzi*, reservoirs in the southern regions of the U.S., tend to be more eutrophic than lakes and reservoirs in the north. This species has rapidly invaded a wide variety of habitats, including flood-plain lakes, large rivers and one of the Great Lakes (Havel and Shurin, 2004; Lennon *et al.* 2003; and Pattinson *et al.* 2003).
\"*D. lumholtzi* takes advantage of late summer thermal niches when the water temperature surpasses 25C and will subsequently continue to colonize lakes and reservoirs across North America. It has been shown, though, that *D. lumholtzi* performs poorly at water temperatures below 10C which may inhibit the range of its expansive into more northern waters\" (Lenon *et al.* 2001).
Daphnia lumholtzi was reported across 50 kms of the lower Mobile-Tensaw River Delta, Alabama, including a downstream site at the head of Mobile Bay. DeVries *et al*. (2006) sampled zooplankton during 2002-2005, at six sites in the Mobile-Tensaw River Delta approximatley once a month. *D. lumholtzi* was found at all six sites. The authors of the study state that \"though salinity was typically at the detection limit of our salinity metre when *D. lumholtzi* was present, this zooplankton was sometimes also present at elevated salinities\", (salinity in the Mobile-Tensaw River Delta remained near zero throughout the year at all upstream sites but was elevated seasonally at downstream sites). The authors further state that \"This work documents an expansion of the range of *D. lumholtzi* and also demonstrates that the species can exist in waters that experience periodic pulses of salinity. The ability of *D. lumholtzi* to survive at low salinity levels beyond what might be found in inland systems (e.g. lake Texoma, Oklahoma-Texas, USA; Work and Gophen 1999) suggests that other coastal environments may be at risk for invasion by *D. lumholtzi*\" (DeVries *et al* 2006).

Reproduction
Under stress, daphnids produce resting eggs or ephippia. Ephippia are resistant to adverse environmental conditions and can lay dormant in sediment where they persist for many years delaying hatching until optimal conditions are present. As a result, the absence of *D. lumholtzi* from a body of water it has previously been found in does not necessarily indicate that it has been extirpated. The ephippia of *D. lumholtzi* are especially well adapted for dispersal. The ephippia of *D. lumholtzi* have hairs and spines along the dorsal edge of the egg that could grip boats or other objects and thus aid dispersal (Benson *et al.* 2004; Dzialowski *et al.* 2000; Shurin and Havel, 2002).

General Impacts
Benson *et al.* (2004) report that the impacts of *D. lumholtzi* are not yet fully understood. Studies have compared native *Daphnia* to this exotic invader and found that competition between these species is lower than expected. *D. lumholtzi* population sizes tend to rise in late summer when native *Daphnia* populations have historically been low allowing *D. lumholtzi* to fill a vacant \"temporal niche\" in the warmer summer months. If *D. lumholzi* has a negative impact on other native zooplankton populations in late summer, this may have a detrimental effect on fishes that depend on zooplankton at that time period but are not able to handle the spines of *D. lumholtzi* since they prevent predation from a number of North American species in the larval and juvenile stages due to gape limitation. In contrast, Leinesch and Gophen (2001) hypothesized that when juvenile fish become large enough to handle *D. lumholtzi*, the fish can grow more rapidly because *D. lumholtzi* represent an additional food source during the late summer when native *Daphnia* are historically rare, reducing and reduce their risk of predation (Benson *et al.* 2004).\r\n
There are three characterisitcs that have probably led to *D. lumholtzi's* high invasion potential. 1) Due to its tropical to subtropical native range, *D. lumholtzi* is adapted to higher temperatures than is native *Daphnia*. 2) *D. lumholtzi* is adapted to disturbed areas, giving it an invasion advantage. 3) The long helmet and tail spine helps *D. lumholtzi* avoid predation .The large spines make it difficult for young fish (larval and juvenile stages) to consume this exotic. The protection from predation afforded by its spines may allow this species to replace native *Daphnia*. If this replacement occurs, the amount of food available to larval and juvenile fishes may be reduced. However, it may also provide a food source for larger fish that are able to handle its spines because it is present during the late summer when native *Daphnia* are historically rare. \"The ultimate effects of this invasive species will become more apparent in subsequent years as long-term trends in zooplankton abundance and fish survival and growth within ecosystems invaded by *D. lumholtzi* are documented\" (Benson *et al.* 2004; Stoeckel and Charlebois, 1999).

Management Info
It is important to prevent the initial introduction *D. lumholtzi* to new locations. Because this species has already become established, work needs to be done to slow its spread. Recreational water users can avoid accidentally spreading established exotic nuisance species (and in some cases prevent new introductions) with a few simple steps. Before leaving boat launch: Inspect boat, trailer, and equipment; then remove any observed plants and animals. Drain, on land, all water from the motor, live well, bilge, and transom well. Empty water from bait buckets on land, and dispose of unwanted bait in trash. After leaving boat launch: Wash all equipment with 104oF water or a high-pressure sprayer or dry equipment for at least five days. Aquarium enthusiasts can help, too, by never dumping aquaria water or aquarium organisms into local lakes or streams (Stoeckel and Charlebois, 1999).

Pathway
D. lumholtzi can be introduced through fish stocking (Havel and Shurin, 2004).. It is uncertain how *D. lumholtzi* was introduced into the U.S. It is suspected that it may have been transported with shipments of Nile perch from Lake Victoria in Africa where it is a dominant zooplankter. Nile perch were originally introduced into Texas as early as 1983 (Benson *et al.* 2004).The continuing discovery of *D. lumholtzi* in new locations could be due to contaminated stockings of fish through international commercial trade. At the same time, the close proximity of affected reservoirs in Missouri and in Texas might lead to the conclusion that *D. lumholtzi* may have spread by recreational boating from the initially infested reservoirs (Benson *et al.* 2004).*D. lumholtzi* can be transported through construction equipment (Havel and Shurin, 2004).It most likely *D. lumholtzi* was brought to North America with African fish imported for the aquarium trade or to stock reservoirs (Stoeckel and Charlebois, 1999).

Principal source: Benson *et al.* 2004. *Daphnia lumholtzi*
Stoeckel and Charlebois, 1999. *Daphnia lumholtzi: The Next Great Lakes Exotic?*

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

Review: Andy Dzialowski Postdoctoral Research Associate, Kansas Biological Survey University of Kansas, USA

Pubblication date: 2006-10-30

ALIEN RANGE

[3] BRAZIL
[1] LAKE ERIE
[1] UNITED KINGDOM
[2] CANADA
[1] LAKE SUPERIOR
[33] UNITED STATES

BIBLIOGRAPHY

19 references found for **Daphnia lumholtzi**

Managment information

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).
The decision support tools are available from:
http://cefas.defra.gov.uk/our-science/ecosystems-and-biodiversity/non-native-species/decision-support-tools.aspx [Accessed 13 October 2011]
The guidance document is available from http://www.cefas.co.uk/media/118009/fisk_guide_v2.pdf [Accessed 13 January 2009].

Stoeckel, J. A., and P. M. Charlebois. 1999. *Daphnia lumholtzi: The Next Great Lakes Exotic?*. Illinois-Indiana Sea Grant College Program, Illinois Natural History Survey.

Summary: Available from:
http://64.233.187.104/search?q=cache:W3DLz6D1PpYJ:www.iisgcp.org/products/iisg9910.pdf+Daphnia+lumholtzi&hl=en [Accessed 07 December 2005]

General information

Benson, A., E. Maynard, and D. Raikow. 2004. *Daphnia lumholtzi*. USGS-NAS (Nonindigenous Aquatic Species Database).

Summary: Available from: http://nas.er.usgs.gov/queries/FactSheet.asp?SpeciesID=164 [Accessed 07 December 2005]

CONABIO. 2008. Sistema de informaci&#65533;n sobre especies invasoras en M&#65533;xico. Especies invasoras - Crust&#65533;ceos. Comisi&#65533;n Nacional para el Conocimiento y Uso de la Biodiversidad. Fecha de acceso.

Summary: English:
The species list sheet for the Mexican information system on invasive species currently provides information related to Scientific names, family, group and common names, as well as habitat, status of invasion in Mexico, pathways of introduction and links to other specialised websites. Some of the higher risk species already have a direct link to the alert page. It is important to notice that these lists are constantly being updated, please refer to the main page (http://www.conabio.gob.mx/invasoras/index.php/Portada), under the section Novedades for information on updates.
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 informaci&#65533;n sobre especies invasoras de m&#65533;xico cuenta actualmente con informaci&#65533;n aceca de nombre cient&#65533;fico, familia, grupo y nombre com&#65533;n, as&#65533; como h&#65533;bitat, estado de la invasi&#65533;n en M&#65533;xico, rutas de introducci&#65533;n y ligas a otros sitios especializados. Algunas de las especies de mayor riesgo ya tienen una liga directa a la p&#65533;gina de alertas. Es importante resaltar que estas listas se encuentran en constante proceso de actualizaci&#65533;n, por favor consulte la portada (http://www.conabio.gob.mx/invasoras/index.php/Portada), en la secci&#65533;n novedades, para conocer los cambios.
Especies invasoras - Crust&#65533;ceos is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Crust%C3%A1ceos [Accessed 30 July 2008]

DeVries, D. R; Russell A. Wright and Tammy S. DeVries., 2006. *Daphnia lumholtzi* in the Mobile River Drainage, USA: Invasion of a Habitat that Experiences Salinity. Journal of Freshwater Ecology, Volume 21. Number 3 September 2006

Dzialowski, A. R., W. J. O Brien, and S. M. Swaffar. 2000. *Range expansion and potential dispersal mechanisms of the exotic cladoceran Daphnia lumholtzi*. Journal of Plankton Research 22(12):2205-2223.

East, T. L., K. E. Havens, A. J. Rodusky, and M. A Brady. 1999. *Daphnia lumholtzi and Daphnia ambigua: population comparison of an exotic and a native cladoceran in Lake Okeechobee, Florida*. Journal of Plankton Research 21(8):1537-1551.

Havel, J. E., and J. B. Shurin. 2004. *Mechanisms, effects, and scales of dispersal in freshwater zooplankton*. Limnol. Oceanogr., 49(4, part 2), 2004, 1229-1238.
Havel, J. E., and P. D. N. Herbert. 1993. *Daphnia lumholtzi in North America: Another Exotic Zooplankter.* Limnology and Oceanography 38(8):1823-1827.
ITIS (Integrated Taxonomic Information System), 2006. Online Database *Daphnia lumholtzi*
Summary: An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals.
Available from: http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=684652 [Accessed 13 September 2006]
Jack, J. D., and J. H. Thorp. 1995. *Daphnia lumholtzi: Appearance and likely impacts of an exotic cladoceran in the Ohio River* . Trans. Kentucky Acad. Sci. Vol. 56, no. 3-4, pp. 101-103. Sep 1995.
Summary: Available from: http://md1.csa.com/partners/viewrecord.php?requester=gs&collection=ENV&recid=4102537 [Accessed 07 December 2005]
King, C. R., and J. G. Greenwood. 1992. *The productivity and carbon budget of a natural population of Daphnia lumholtzi Sars*. Hydrobiologia 231 : 1 9 7 -207, 1992 .
Kolar, C. S., J. C. Boase, D. F. Clapp, and D. H. Wahl. 1997. *Potential effect of invasion by an exotic zooplankter, Daphnia lumholtzi*. Journal of Freshwater Ecology Vol. 12, no. 4, pp. 521-530. Dec 1997.
Summary: Available from: http://md1.csa.com/partners/viewrecord.php?requester=gs&collection=ENV&recid=4251484 [Accessed 07 December 2005]
Lennon, J. T., V. H. Smith, and A. R. Dzialowski. 2003. *Invasibility of plankton food webs along a trophic state gradient*. OIKOS 103: 191-203, 2003.
Lenon, J. T., V. H. Smith, and K. Williams. 2001. *Influence of temperature on exotic Daphnia lumholtzi and implications for invasion success*. Journal of Plankton Research 23(4):425-434.
Muzinic, C. J. 2000. *First Record of Daphnia lumholtzi Sars in the Great Lakes*. Journal of Great Lakes Research Vol. 26, no. 3, pp. 352-354. 2000.
Summary: Available from: http://md1.csa.com/partners/viewrecord.php?requester=gs&collection=ENV&recid=4804400 [Accessed 07 December 2005]
Pattinson, K. R., J. E. Havel, and R. G. Rhodes. 2003. *Invasibility of a reservoir to exotic Daphnia lumholtzi: experimental assessment of diet selection and life history responses to cyanobacteria*. Freshwater Biology (2003) 48, 233-246.
Shurin, J. B., and J. E. Havel. 2002. *Hydrologic connections and overland dispersal in an exotic freshwater crustacean*. Biological Invasions 4: 431-439, 2002.
Zanata, L. H., E. L. Espindola, O. Rocha, and R. H. Pereira. 2003. *First Record Of Daphnia lumholtzi (SARS, 1885), Exotic Cladoceran, In Sao Paulo State (Brazil)*. Braz. J. Biol., 63(4): 717-720, 2003.
Summary: Available from: http://www.scielo.br/scielo.php?pid=S1519-69842003000400019&script=sci_arttext&tlng=en [Accessed 07 December 2005]