

## *Najas minor*

**System:** Terrestrial

| Kingdom | Phylum        | Class      | Order     | Family     |
|---------|---------------|------------|-----------|------------|
| Plantae | Magnoliophyta | Liliopsida | Najadales | Najadaceae |

**Common name** slender-leaved naiad (English), brittle naiad (English), brittle waternymph (English), slender naiad (English), European naiad (English), minor naiad (English), spiny-leaf naiad (English)

**Synonym** *Caulinia minor* , (All) Coss. & Germ.

**Similar species** *Najas flexilis*, *Ceratophyllum*, *Najas gracillima*, *Najas guadalupensis*

**Summary** *Najas minor* is a submerged aquatic herb native to Europe and Asia that has established in eastern United States and Ontario. Initially recorded in the 1930s, it has established populations in 26 states in the US. It creates dense, monospecific stands that may displace native aquatic plants and reduce the recreational and aesthetic value of lakes, ponds, and rivers.



[view this species on IUCN Red List](#)

### Species Description

*Najas minor* is a submersed, annual, aquatic herb. Its growth is usually compact and relatively bushy. The stems may reach up to 2.5 m long and are profusely branched near their apex. Leaves are opposite or subopposite, about 1 mm wide and 0.5 to 3.5 cm long, becoming stiff and recurved with age. Leaves have 7 to 15 small, but conspicuous teeth along each side of the leaf. Sheaths at the base of the leaf are truncate to auriculate, with fine teeth along the upper margin. Flowers are small, inconspicuous, and borne in the leaf axils on the same plant. Fruits are single seeded but abundantly produced. Fruits are 1.5 to 3.0 mm long and slightly curved with rectangular areolae arranged in distinct longitudinal rows. (EL-ERDC, 2007; Cao, 2010).

### Lifecycle Stages

The reproductive season of *Najas minor* starts in July, when flowers appear. Seed production peaks in September, and continues into October. During the late summer or early fall, the stems become brittle, and the profusely branched apical portions of the stem break into small fragments. Seeds remain attached in the leaf axils, and the fragments are dispersed by wind and water currents. Seed germination occurs in early spring to late summer (Cao, 2010; DNR, 2007).

### Uses

*Najas minor* is a preferred food source for waterfowl who readily consume its abundant seed supply (DNR, 2007).

### Habitat Description

*Najas minor* prefers calm waters such as ponds, lakes, and reservoirs but may grow in streams and rivers as well. It prefers alkaline environments and is known to inhabit pH levels of 6.0-9.3 with an optimum range of about 6.6-7.2. It occurs of depths of up to 5 m with an ideal optimum of about 0.5-2 m and temperatures down to 8°C. It may inhabit brackish waters with a salinity of up to 0.3 ppt. *N. minor* is tolerant to turbidity and eutrophic conditions, which may allow it to out compete and replace native species (DNR, 2007; Wentz & Stuckey, 1971; Robinson, 2004)



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## Reproduction

*Najas minor* reproduces sexually and asexually. Sexual production of an abundant seed supply and seed banks of up to tens of millions of seeds/ha appears to be its primary means of reproduction. It may also reproduce vegetatively producing clonal populations that may fragment and propagate (DNR, 2007; EL-EDRC, 2007)

## General Impacts

*Najas minor* establishes dense monocultures that may exclude other native aquatic plants and replaces native *Najas* species. Unlike some of the other invasive aquatic plants *N. minor* does not produce long stems that spread on the surface of the water; it grows very densely under the surface producing shoots up to a meter long that shade out other plants and interfere with recreational activity such as swimming, boating, and fishing and reduce the aesthetic value of waters. It is also believed to induce conditions that are adverse to fish and waterfowl. *N. minor* may reduce the discharge capacity of channels as well. Its negative effects are typically amplified in enriched, low-energy systems (DNR, 2007; Hellquist & Straub, 2002; Cao, 2010; Capers *et al*, 2005).

## Management Info

**Preventative measures:** *Najas minor* is reported as noxious and is regulated in Alabama, Connecticut, Maine, Massachusetts, New Hampshire, South Carolina, Washington. It is illegal to possess, import, purchase, sell, propagate, transport, or introduce *N. minor* in Minnesota. *N. minor* was included on a Washington Department of Agriculture list of quarantined species in 2000, and it is illegal to sell, trade, or transport in the state of Washington. Education and population monitoring are recommended to help prevent its establishment (DNR, 2007; Hamel & Parsons, 2001).

**Chemical:** Small scale herbicide treatments of endothall, dipotassium, and endothall mono have been conducted in hopes to provide "nuisance relief." However, it has been reported that some non-target plant species have been affected as well. The following herbicides and brands were reported to yield excellent control for *N. minor* by the US Army Corp of Engineers: diquat: Reward, Weedtrine-D; fluridone: Sonar AS, Sonar SRP, Sonar PR, Sonar Q, and Avast!; and endothall Aquathol K, Aquathol Super K, Hydrothol 191. *N. minor* was found to be completely unaffected by the herbicide butachlor (DNR, 2007; EL-EDRC, undated; Chattopadhyay *et al*, 2006).

**Mechanical:** The use of aquatic plant harvesters, large boats that cut and remove vegetation, has been recommended as a means to remove large quantities of *Najas minor*. Similarly, rotovators, basically large underwater rototillers that remove aquatic plant tissue and root crowns, are another recommended mechanical control. The use of hand cutters may be effective for smaller populations (EL-EDRC, undated).

## Pathway

*Najas minor* may be introduced through disposal of aquarium species (DNR, 2007). *Najas minor* or its seeds may cling to boat hulls or boat trailers in inconspicuous places and be transported to other locations where they can establish (Capers *et al*, 2005).

**Principal source:** [Department of Natural Resources \(DNR\), Wisconsin., 2007. Aquatic Plant Brittle/Lesser/Bushy/Slender/Spiny/Minor Naiad: Waterynymph Environmental Laboratory \(EL\) U.S. Army Engineer Research and Development Center \(ERDC\), 2007. Information Sheet: \*Najas minor\* L. \(Spiny Naiad\)](#)  
[Ling Cao. 2010. \*Najas minor\*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL.](#)

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

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### ALIEN RANGE

Global Invasive Species Database (GISD) 2024. Species profile *Najas minor*. Available from: <https://www.iucngisd.org/gisd/species.php?sc=1560> [Accessed 27 July 2024]



[2] CANADA

[34] UNITED STATES

## BIBLIOGRAPHY

32 references found for *Najas minor*

### Management information

[Chattopadhyay, A; S. Ahdikari; S. P. Adhikary and S. Ayyapan., 2006. Evaluation of Butachlor for Control of Submerged Macrophytes Along with its Impact on Biotic Components of Freshwater System. Iran. J. Environ. Health. Sci. Eng., 2006. Vol. 3, No. 2 ,pp. 103-108](#)

**Summary:** Available from: <http://www.bioline.org.br/pdf?se06016> [Accessed November 10 2007]

Department of Natural Resources (DNR), Wisconsin, 2007. Aquatic Plant Brittle/Lesser/Bushy/Slender/Spiny/Minor Naiad; Waternymph EDDMapS. 2013. *Najas minor*- Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health.

**Summary:** Available from: <http://www.eddmaps.org/> [Accessed January 3, 2013]

Environmental Laboratory (EL) U.S. Army Engineer Research and Development Center (ERDC), 2007. *Najas minor* All. (Slender Naiad) Herbicide Information

Environmental Laboratory (EL) U.S. Army Engineer Research and Development Center (ERDC), 2007. *Najas minor* All. (Slender Naiad) Mechanical Control Information

Environmental Laboratory (EL) U.S. Army Engineer Research and Development Center (ERDC), 2007. Information Sheet: *Najas minor* L. (Spiny Naiad)

[National Agricultural Pest Information System \(NAPIS\), 2010. Pest Tracker Reported Status of Brittle Naiad - \*Najas minor\*](#)

**Summary:** Available from: <http://pest.ceris.purdue.edu/searchmap.php?selectName=PDJABBE> [Accessed November 16 2009]

Richardson, Robert J., 2008. Aquatic Plant Management and the Impact of Emerging Herbicide Resistance Issues. Weed Technology 2008 22:8-15

The Nature Conservancy (TNC), 2009. Invasive Plant Distribution Map Ohio: *Najas minor* Lesser naiad

[Vermont Invasive Exotic Plant Committee, February 18, 2005. Vermont's Wildlife Action Plan: Invasive Species Watch List for Vermont. Appendix K Exotic Invasive & Pest Species](#)

**Summary:** Available from:

[http://www.vtfishandwildlife.com/library/Reports\\_and\\_Documents/Vermonts\\_Wildlife\\_Action\\_plan/\\_report/7\\_Appendix/K\\_Invasive\\_Exotic\\_and\\_Pest\\_Species.pdf](http://www.vtfishandwildlife.com/library/Reports_and_Documents/Vermonts_Wildlife_Action_plan/_report/7_Appendix/K_Invasive_Exotic_and_Pest_Species.pdf) [Accessed November 16 2009]

### General information

Alan, W. Wentz and Ronald L. Stuckey., 1971. The Changing Distribution of the Genus *Najas* (Najadaceae) in Ohio. The Ohio Journal of Science 71(5): 292, September 1971

Bruinsma, J.H.P. 1994. The occurrence of *Najas minor* All. in the Eindhovenkanaal in 1992 and 1993 [Het voorkomen van *Najas minor* All. (Klein nimfkruid) in het Eindhovens Kanaal in 1992 en 1993]. Gorteria: Tijdschrift voor Onderzoek aan de Wilde Flora Volume 20, Issue 1, 1994, Pages 18-27 .

Cao, Ling, 2010. *Najas minor*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL.

Capers, Robert S., Gregory J. Bugbee, Roslyn Selsky and Jason C. White, 2005. A Guide to Invasive Aquatic Plants of Connecticut. The Connecticut Agricultural Experiment Station Bulletin 997 January 2005

Capers, Robert S., Roslyn Selsky, Gregory J. Bugbee, Jason C. White, 2007. Aquatic Plant Community Invasibility and Scale Dependent Patterns in Native and Invasive Species Richness. Ecology: Vol. 88, No. 12, pp. 3135-3143.

[Global Compendium of Weeds \(GCW\), 2007. \*Najas minor\* \(Najadaceae\)](#)

**Summary:** Available from: [http://www.hear.org/gcw/species/najas\\_minor/](http://www.hear.org/gcw/species/najas_minor/) [Accessed November 16 2009]

[Hamel, Kathy, S & Jenifer K. Parsons, 2001. Washington s Aquatic Plant Quarantine. J. Aquat. Plant Manage. 39: 72-75](#)

**Summary:** Available from: <http://www.sgnis.org/publicat/papers/hamepars.pdf> [Accessed November 16 2009]

[Hellquist, C. Barre & James Straub, 2002. A Guide to Selected Invasive Non-native Aquatic Species in Massachusetts](#)

**Summary:** Available from: [http://www.fosterspond.com/aquatic\\_species.pdf](http://www.fosterspond.com/aquatic_species.pdf) [Accessed November 16 2009]

[Integrated Taxonomic Information System \(ITIS\), 2010. \*Najas minor\* All.](#)

**Summary:** Available from: [http://www.itis.gov/servlet/SingleRpt/SingleRpt?search\\_topic=TSN&search\\_value=39002](http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=39002) [Accessed November 16 2009]

[Invasive.org, 2010. Brittleleaf naiad \*Najas minor\* All. Invasive.org: Center for Invasive Species and Ecosystem Health. The University of Georgia - Warnell School of Forestry and Natural Resources and College of Agricultural and Environmental Sciences - Dept. of Entomology. www.invasive.org.](#)

**Summary:** Available from: <http://www.invasive.org/species/subject.cfm?sub=3056> [Accessed March 19 2010]

Les, D.H. and Mehrhoff, L. J. 1999. Introduction of nonindigenous aquatic vascular plants in southern New England: a historical perspective. Biological Invasions 1: 281-300, 1999.

Lowden, Richard M. 1986. Taxonomy of the genus *Najas* L. (Najadaceae) in the Neotropics. Aquatic Botany, 24 (1986) 147-184.

[Maryland Department of Natural Resources \(MDNR\), Undated. Naiads \*Najas\* spp.](#)

**Summary:** Available from: <http://www.dnr.state.md.us/bay/SAV/key/naiads.pdf> [Accessed November 16 2009]

[Nelson, Edward N. and Couch, Richard W. 1981. Occurrence of \*Najas minor\* and \*Najas marina\* \(Najadaceae\) in Oklahoma. Department of Natural Sciences, Oral Roberts University, Tulsa, Oklahoma 74171. Proc. Okla. Acad. Sci. 61:78 \(1981\)](#)

**Summary:** Available from: [http://digital.library.okstate.edu/oas/oas\\_pdf/v61/p78.pdf](http://digital.library.okstate.edu/oas/oas_pdf/v61/p78.pdf) [Accessed November 16 2009]

[Robinson, Michelle, 2004. European Naiad: An Invasive Aquatic Plant: \*Najas minor\*. Commonwealth of Maryland Department of Conservation and Recreation. D.C.R Office of Water Resources, Lakes and Ponds Program.](#)

**Summary:** Available from: <http://www.mass.gov/dcr/watersupply/lakepond/factsheet/European%20Naiad.pdf> [Accessed March 19 2010]

Rybicki, Nancy B; Landwehr, Jurate M., 2007. Long-term changes in abundance and diversity of macrophyte and waterfowl populations in an estuary with exotic macrophytes and improving water quality. Limnology & Oceanography. 52(3). MAY 2007. 1195-1207.



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[Smagula, A.P., Burack, T.S., Walls, M., Stewart, H.T., Currier, P.M., Estabrook, R. & Connor, J. 2008. Report of the New Hampshire Exotic Aquatic Species Program 2006-2008. New Hampshire Department of Environmental Services.](#)

**Summary:** Available from: <http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/r-wd-09-08.pdf> [Accessed 14 June, 2010]

Trebitz, Anett S; Taylor, Debra L., 2007. Exotic and invasive aquatic plants in Great Lakes coastal wetlands: Distribution and relation to watershed land use and plant richness and cover. *Journal of Great Lakes Research*. 33(4). DEC 2007. 705-721.

Trebitz, A.S., Taylor, D.L. 2007. Exotic and invasive aquatic plants in Great Lakes coastal wetlands: Distribution and relation to watershed land use and plant richness and cover. *Journal of Great Lakes Research* 33 (4), pp. 705-721.

[USDA, ARS, 2010. Taxon: \*Najas minor\* All. National Genetic Resources Program. Germplasm Resources Information Network - \(GRIN\) \[Online Database\]. National Germplasm Resources Laboratory, Beltsville, Maryland.](#)

**Summary:** Available from: [http://www.ars-grin.gov/cgi-bin/npgs/html/tax\\_search.pl?Najas%20minor](http://www.ars-grin.gov/cgi-bin/npgs/html/tax_search.pl?Najas%20minor) [Accessed November 16 2009]

[USDA, NRCS, 2010. \*Najas minor\* All. brittle watery nymph The PLANTS Database \(<http://plants.usda.gov>, 22 February 2010\). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.](#)

**Summary:** Available from: <http://plants.usda.gov/java/profile?symbol=NAMI> [Accessed November 16 2009]

Zalewska, Joanna. 1999. The genus *Najas* (Najadaceae) in Poland: Remarks on taxonomy, ecology, distribution and conservation. *Fragmenta Floristica et Geobotanica*. 44(2). 1999. 401-422.