

Scientific name	<i>Elodea canadensis</i>
Common name	Canadian water/pondweed
Broad group	Plant
Number of and countries wherein the species is currently established	21: AT, BE, BG, CZ, DE, DK, EE, FI, FR, HU, IE, IT, LT, LU, LV, NL, PL, PT, RO, SE, UK
Risk Assessment Method	GB NNRA
Links	https://secure.fera.defra.gov.uk/nonnativespecies/downloadDocument.cfm?id=617
1. Description (Taxonomy, invasion history, distribution range (native and introduced), geographic scope, socio-economic benefits)	<i>Elodea canadensis</i> is traded for ornamental purposes, but not imported anymore (local production) (Brunel, 2009).
6. Can broadly assess environmental impact with respect to ecosystem services	Where <i>Elodea canadensis</i> persists in dense populations, the plant may affect provisioning, regulating and cultural services by fouling of water supply systems, crowding of recreational waterways, effect on angling, watersports and boating (Hassan & Ricciardi, 2014).
8. Includes status (threatened or protected) of species or habitat under threat	May be found in protected habitats but probably not at dense populations. Dense mats only found in anthropogenic habitats recently colonized (GB NNRA).
9. Includes possible effects of climate change in the foreseeable future	Under greenhouse conditions, the June/July growth of individually potted <i>E. canadensis</i> over temperatures ranging from 12 to 32 °C was monitored (Barko <i>et al.</i> , 1982, Barko & Smart, 1983). A general positive relationship between total biomass production and temperature was demonstrated. Greenhouse warming may result in earlier onset of growth and possible dominance of those species for which germination and the resumption of growth are primarily controlled by a rise in temperature. This phenomenon is reported for populations of <i>E. canadensis</i> . Several studies in waters influenced by thermal discharge support this idea, at least in

	<p>part. In such systems an increase in the abundance of aquatic macrophytes at the cost of other submerged macrophytes is reported (Haag, 1979). The emergent macrophytes such as <i>E. canadensis</i>, emerged earlier and grew better in the warmer conditions of the greenhouse pond (maintained at 2-3C higher than ambient) compared with those in the reference pond. The difference in above-ground biomass throughout the growing seasons was >2 fold and after three experimental growing seasons the difference in below-ground biomass of macrophytes was 2.5-fold between the ponds (Kankaala <i>et al.</i>, 2000). The relative growth rate of both species was strongly affected by growth conditions and increased by up to 4-5 times with increased temperature and inorganic carbon availability (Olesen & Madsen, 2000). In general, growth rates increased with temperature with a Q10 varying from 2.3 to 3.5. However, at 5°C, growth was nearly arrested (Madsen & Brix, 1997). In ice-free areas near power plant outfalls it was found that <i>E. canadensis</i> dominated other species, which were not active during winter because their dormancy mechanisms were regulated by environmental cues other than temperature (Brock & van Vierssen, 1992, Haag, 1979). Decreasing impact in Ireland (Kelly <i>et al.</i>, 2014).</p>
<p>11. Documents information sources</p>	<p>Barko J, Hardin D, Matthews M. 1982. Growth and morphology of submersed freshwater macrophytes in relation to light and temperature. <i>Canadian Journal of Botany</i> 60: 877-887.</p> <p>Barko J, Smart R. 1983. Effects of organic matter additions to sediment on the growth of aquatic plants. <i>The journal of Ecology</i>: 161-175.</p> <p>Brock TC, van Vierssen W. 1992. Climatic change and hydrophyte-dominated communities in inland wetland ecosystems. <i>Wetlands Ecology and Management</i> 2: 37-49.</p> <p>Brunel S. 2009. Pathway analysis: aquatic plants imported in 10 EPPO countries. <i>EPPO Bulletin</i> 39: 201-213.</p> <p>Haag RW. 1979. The ecological significance of dormancy in some rooted aquatic plants. <i>The journal of Ecology</i>: 727-738.</p> <p>Hassan A, Ricciardi A. 2014. Are non-native species more likely to become pests? Influence of biogeographic origin on the impacts of freshwater organisms 3. <i>Frontiers in Ecology and the Environment</i> 12: 218-223.</p> <p>Kankaala P, Ojala A, Tulonen T, Haapamäki J, Arvola L. 2000. Response of littoral vegetation on climate warming in the boreal zone; an experimental simulation. <i>Aquatic Ecology</i> 34: 433-444.</p> <p>Kelly R, Leach K, Cameron A, Maggs CA, Reid N. 2014. Combining global climate and regional landscape models to improve prediction of invasion risk. <i>Diversity and Distributions</i>.</p> <p>Madsen TV, Brix H. 1997. Growth, photosynthesis and acclimation by two</p>

	<p>submerged macrophytes in relation to temperature. <i>Oecologia</i> 110: 320-327.</p> <p>Olesen B, Madsen TV. 2000. Growth and physiological acclimation to temperature and inorganic carbon availability by two submerged aquatic macrophyte species, <i>Callitriche cophocarpa</i> and <i>Elodea canadensis</i>. <i>Functional Ecology</i> 14: 252-260.</p> <p>See also:</p> <ul style="list-style-type: none"> - Irish risk analysis report
Main experts	<p>Johan van Valkenburg</p> <p>Etienne Branquart</p>
Other contributing experts	<p>Belinda Gallardo</p>
Notes	<p>GB NNRA medium risk but NOT VALIDATED BECAUSE OF INFORMATION GAPS. EPPO has not risk assessed this species because it is widespread in Europe. Some experts considered this species should be downgraded to a low risk because of decreasing populations (unknown causes) and replacement/outcompetition by other non-native Hydrocharitaceae. Included in the NL red list of plants. The GB NNRA risk assessment is under review in GB, which is taking into account new information relating to impact. Comments and changes to the original GBNNRA have been initiated but have not yet been included or validated within the GB NNRA.</p> <p>Area at risk: already colonized most of potential area</p>
Outcome	<p>NOT COMPLIANT (major information gaps)</p>