

The history of alien aquatic plants in North Rhine-Westphalia

The first record of an alien aquatic plant species (*Elodea canadensis*) in North Rhine-Westphalia was reported in 1865. This species is up to date the most popular alien aquatic plant species, due to problems the species caused for a long time several decades ago. But in the last decades the species decreased in parallel to the fast spread of *Elodea nuttallii*, which displaced *Elodea canadensis* in many locations. At present *Elodea nuttallii* is the most distributed alien aquatic plant species in North Rhine-Westphalia. *Elodea nuttallii* causes problems in some lakes and reservoirs, covering almost the total water body and forming dense mats up to the water surface.

In the last two decades some further new alien aquatic plant species were recorded for water bodies of North Rhine-Westphalia. Some of these species are only casual (like *Pistia stratiotes*, *Eichhornia crassipes*) and some of them are only reported once. Some other species, like *Crassula helmsii*, *Egeria densa*, *Hydrocotyle ranunculoides* (Figure 1 and 2), *Hygrophila polysperma* (Figure 4) and *Myriophyllum aquaticum* are known from other countries, where they cause several problems. Some of these species are only known for several years in North Rhine-Westphalia (e.g. *Hydrocotyle ranunculoides* since 2004; Hussner & van de Weyer 2004, Hussner et al. in press) and spread out, but until now there are still no comparable problems with the species like in other European countries.



In spite of that, there are some problems with other alien aquatic species in North Rhine-Westphalia and make a management inevitable. *Elodea nuttallii* and *Myriophyllum heterophyllum* (Figure 3) form dense stands and inhibit human use (fishing, navigation, rowing, drinking water supply, hydropower and swimming) of the affected water bodies (Podraza et al. 2005, Hussner et al. submitted).



Figure 1, 2: A dense mat of *Hydrocotyle ranunculoides* (top) and a flowering and fruiting plant (bottom)

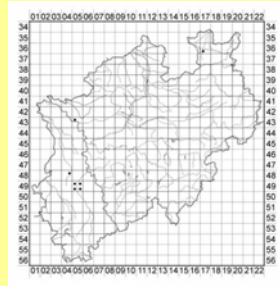


Figure 3: The present distribution of *Hydrocotyle ranunculoides* in NRW



Figure 4: *Myriophyllum heterophyllum* at Heider Bergsee (near Cologne)



Figure 5: *Hygrophila polysperma* at the river Erft

Table 1: List of the alien aquatic plants of North Rhine-Westphalia (NRW)

scientific name	first record in NRW	distribution	expansive / not expansive	established / not established
<i>Azolla filiculoides</i>	not known	xxx	locally expansive	locally established
<i>Crassula helmsii</i>	1988	xx	locally expansive	established
<i>Egeria densa</i>	1914	xx	not expansive	locally established
<i>Eichhornia crassipes</i>	not known	x	not expansive	not established
<i>Elodea canadensis</i>	1865	xxx	not expansive	established
<i>Elodea nuttallii</i>	1953	xxxxx	expansive	established
<i>Hydrocotyle ranunculoides</i>	2004	xx	expansive	established
<i>Hygrophila polysperma</i>	2005	x	???	not established
<i>Lagarosiphon major</i>	2001	x	not expansive	established
<i>Lemma aequinoctialis</i>	1982	x	not expansive	not established
<i>Lemma minuta</i>	1981	xxxx	expansive	established
<i>Lemma turionifera</i>	1991	xxx	expansive	established
<i>Myriophyllum aquaticum</i>	1988	xx	locally expansive	locally established
<i>Myriophyllum heterophyllum</i>	1979	xx	locally expansive	established
<i>Pistia stratiotes</i>	1981	x	not expansive	not established
<i>Shinnersia rivularis</i>	1992	x	not expansive	not established
<i>Vallisneria spiralis</i>	1966	x	not expansive	locally established

Legend: x: very rare; xx: rare; xxx: common; xxxx: frequent; xxxxx: abundant / ???: unexplained (according to: Hussner, submitted)

Management of alien aquatic plants in North Rhine-Westphalia

A management of aquatic plants in North Rhine-Westphalian rivers is already performed for several decades. In the past, a management of the rivers comprised the control of native and alien aquatic plant species to preserve the drain of the running water. But in the last years there is also a management of alien aquatic plants in reservoirs and lakes in North Rhine-Westphalia (Table 2). The management in North Rhine-Westphalia especially encompasses cutting, but also a biological control by native herbivorous fishes like roach (*Rutilus rutilus*). Some fishing organisations use exotic grass carps (*Ctenopharyngodon idella*) for control, but the fishes eradicate all macrophytes from the water bodies and often the lakes are free of all kinds of macrophytes few years

Table 2: List of lakes with management of alien aquatic plants in North Rhine-Westphalia

name	type of water body	daminant macrophyte species	measurements
Harkortsee	shallow reservoir	<i>Elodea nuttallii</i>	cutting; biological control (native herbivorous fishes)
Hengsteysee	shallow reservoir	<i>Elodea nuttallii</i>	cutting; biological control (native herbivorous fishes)
Kemnader See	shallow reservoir	<i>Elodea nuttallii</i>	cutting; biological control (native herbivorous fishes)
Beyenburger See	shallow reservoir	<i>Elodea nuttallii</i>	cutting; biological control (native herbivorous fishes)
Unterbacher See	gravel pit	<i>Elodea nuttallii</i>	cutting
Heider Bergsee	mining lake	<i>Myriophyllum heterophyllum</i>	cutting
Schwanenspiegel	shallow artificial lake	<i>Myriophyllum heterophyllum</i>	cutting
Spee'scher Graben	shallow artificial lake	<i>Myriophyllum heterophyllum</i>	cutting
Kaiserteich	shallow artificial lake	<i>Myriophyllum heterophyllum</i>	cutting



Figure 6: Cutting boat of the Ruhrverband in reservoir Kemnader See



Figure 7: *Elodea nuttallii* after cutting in reservoir Kemnader See

after the input of these fishes, causing serious problems for the ecosystem. The input of exotic grass carps does not match with the aim concerning macrophyte dominance in shallow lakes according to the EU Water-Framework-Directive.

Recently a research project was created about expansive macrophytes in reservoirs of the river Ruhr (Podraza et al. in press). The research comprises the effects of management on *Elodea* (Figure 6, 7). First results of this project show that the effect of cutting on the dense stands of *Elodea nuttallii* is very marginal. The plants grow fast and reach the water surface only few weeks after cutting.

In contrast, the effect of cutting on the evergreen species *Myriophyllum heterophyllum* in some shallow lakes in Düsseldorf is much better. A total eradication of this species is hardly to reach, but the cut plants grow slowly and do not reach the water surface of these small lakes within several months.

References

- Hussner, A. & Weyer, K. van de (2004): *Hydrocotyle ranunculoides* L.f. (Apiaceae) - Ein neuer aquatischer Neophyt in Rheinland. - Floristische Rundbriefe 38 (1/2): 1-6.
 Hussner, A., van de Weyer, K. & Wiehler, K.-H. (in press): Zum gegenwärtigen Stand der Ausbreitung des Großen Wassernabels (*Hydrocotyle ranunculoides* L. fil.) in Nordrhein-Westfalen. - Decheniana.
 Hussner, A., Nienhaus, I. & Krause, T. (submitted): Zur Verbreitung von *Myriophyllum heterophyllum* Michx. in Nordrhein-Westfalen. - Floristische Rundbriefe.
 Hussner, A. (submitted): Die aquatischen Neophyten in Nordrhein-Westfalen. - Decheniana
 Podraza, P., Nusch, E. & Weyer, K. van de (in press): Massenentwicklung von *Elodea nuttallii* (PLANCHON) ST. JOHN in den Ruhrtauseen. Deutsche Gesellschaft für Limnologie - Tagungsbericht 2005 (Karlsruhe).