Hydrilla

Hydrilla verticillata (L. f.) Royle

Synonyms: *Elodea verticillata* (L.f.) F. Muell.
Other common names: Florida elodea, waterthyme
Family: Hydrocharitaceae

Description
Hydrilla is a submerged aquatic perennial. Stems typically are rooted in the substrate and branch freely. Stems nodes and fragments can develop adventitious roots. Leaves are sessile, linear to lanceolate, four to eight at the whorl, ¼ to ¾ inches long. Leaves have toothed margins which are usually visible to the naked eye. Roots slender, unbranched, developing ovoid structures at the tips (tubers). Tubers are tough, whitish to brown-black, ¾ inches long. Male and female flowers are floating on long threadlike flower tubes. Sepals and petals are translucent, white to reddish. Male flowers detach at maturity and float on the surface, releasing pollen. Monoecious (both male and female flowers on the same plant) and dioecious (male and female flowers on different plants) biotypes occur in North America. Fruit is narrowly cylindrical, smooth or with irregular spines (DiTomaso and Healy 2003, Thorne 1993).

Hydrilla may be confused with common elodea (*Elodea canadensis*). Elodea is native to the central and northern United States and parts of Canada, but is exotic to Alaska. Hydrilla can be distinguished from elodea by its sharply toothed leaf margins (DiTomaso and Healy 2003).

Ecological Impact
Impact on community composition, structure, and interactions: Hydrilla can form a dense mat near the water surface, intercept sunlight and eventually displace native aquatic plants. Hydrilla infestations may reduce seed production of native species, resulting in a reduction in the number of native species in the community (de Winton and Clayton 1996). Hydrilla may also shift the phytoplankton composition (Canfield et al. 1984). Infestations also adversely affect fish populations. Hydrilla appears to be an important habitat for number of mosquito species (Hearnden and Kay 1997).
Impact on ecosystem process: Hydrilla infestations slow the movement of water, causing flooding. It degrades water quality, increase sedimentation rate and water temperature (Bossard et al. 2000). It also affects water nutrient turnover (Bole and Allan 1978, Sinha et al. 2000).

Biology and Invasive Potential
Reproductive potential: Hydrilla can reproduce by seed, fragmentation, tubers, and turions (Steward 1992, Spencer and Rejmanek 1989).Turions, axillary leaf buds, are small and light weight and suited for dispersal, whereas the tubers, formed terminally on rhizomes, are heavier, contain starch, and are better adapted for winter survival.
Role of disturbance in establishment: Hydrilla is known establish in undisturbed aquatic communities (Bossard et al. 2000). Any mechanical disturbance increases the possibilities for establishment.
Potential for long-distance dispersal: Tubers survive ingestion by waterfowl and can be transported from one water body to another (Joyce et al. 1980).
Potential to be spread by human activity: Small pieces of hydrilla stems can travel on boat trailers or planes (Bossard et al. 2000).
Germination requirements: Seed production appears to have little importance in hydrilla reproduction. Turions and tubers are able to germinate in complete darkness, but optimal germination occurrs at fairly low light intensities.
Growth requirements: Hyrdilla is able to grow in a wide range of aquatic habitats. It is found in both low and high nutrient waters. It is best adapted to fresh water (Twilley and Barko 1990), but it can tolerate low salinity (Haller et al. 1974, Steward and Van 1987). It also tolerates a wide range of pH, but tends to grow better at pH 7. This plant is generally known as a plant of warm climates; however it is capable of

significant photosynthetic activity at temperatures as low as 51°F.
Congeneric weeds: none
Listing: Hydrilla verticillata is declared a Federal Noxious Weed in US. It is also listed noxious in 17 American states (Rice 2006, USDA, NRCS 2006).

Distribution and abundance
Native and current distribution: Hydrilla is probably native to the warmer regions of Asia (Cook and Lüönd 1982). It is a cosmopolitan species that occurs in Europe, Asia, Australia, New Zealand, the Pacific Islands, Africa, North and South America. In the United States hydrilla populations occur in all southeastern states and in Arizona, California and Washington (USDA, NRCS 2006). This species has not been documented in Alaska (Hultén 1968, Pfauth and Sytsma 2005, UAM 2004).

Management
Cost of hydrilla management is extremely high. Management methods currently include mechanical removal, herbicide applications, and biological control. Hydrilla is fragmented easily and damaged plants that are not removed by mechanical control methods can act as a source of reestablishment. Several species of weevils, leaf-mining flies, and moth have been introduced to control hydrilla (Bossard et al. 2000, Langeland 1996).

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