

European Frogbit

Hydrocharis morsus-ranae, Linnaeus, 1753



Last Updated: February 2018



www.aphotoflora.com/flower



Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

Overview:

European frogbit is an annual aquatic free-floating plant native to Europe and parts of Asia and Africa.¹ It was intentionally introduced to Canada in 1932 as an ornamental pond plant.⁴ By the 1980 it had reached Lake Ontario and Quebec City. It has subsequently spread into bordering U.S. states such as Michigan, New York and Vermont.¹

European frogbit can reproduce by seed; however, this is rare primarily, it reproduces vegetatively by stolons. During the growing season, stolons facilitate rapid expansion of floating mats, which can expand at rates as fast as 15 km per year.¹ This plant produces turions (winter buds) and stolon buds in leaf axils, which can produce new plants. Stolons do not break easily.¹ Its trailing roots do not anchor the plant to the bottom but instead entangle other plants to

stabilize the mats.²

European frogbit may be confused with other round-leaved native aquatic plants but is distinguished by five prominent veins and converging primary veins. Seedlings can be distinguished from duckweeds by its roots, which originate from a rosette base or leaf petiole.¹

Several birds, rodents, fish and insects utilize European frogbit as a food source but not to the level which exerts control on the plant's population.¹

As of January 1, 2016, the possession, sale, or transport of this species in Alberta is illegal under the Fisheries Act.

Impacts:

Large, floating mats of *H. morsus-ranae* reduce biodiversity by

displacing native plants, and prevent light from reaching submerged native plants.¹ Native flora have been observed to support a greater diversity of native aquatic organisms.¹ Mats can also interfere with the proper functioning of wetlands by impeding water flow and can also clog water intakes, causing economic impacts.¹ European frogbit dies off in the fall and decompose in the water, consuming oxygen. While the same occurs with native aquatic plants, the much greater biomass of European frogbit would consume greater amounts of oxygen during decomposition, depriving fish and other native aquatic organisms of necessary oxygen.¹

Habitat:

European frogbit inhabits the shallow, slow-moving waters of lake/pond edges, sheltered bays, open marshes and wetlands.¹ It needs an organic



European Frogbit *(continued)*

substrate for development and favors calcium-poor waters. It is intolerant of clay/mineral substrates, nutrient-poor waters, and any pollution of turbidity which limits light for turion germination.¹ Often associated with rushes and cattails as these plants provide some protection from wind and waves, although European frogbit is able to recover from compression.¹

Identification:

Stolons extend during the growing season and multiple rosettes 1-30 cm wide develop along its length.² Individual plants measure 0.1-1.5 m across. Stolons do not fragment easily. Roots are up to 50 cm long with numerous long root hairs and generally unbranched.¹ The roots extend from ramets/plantlets along the stolons.³ Roots change colour from green to white as they develop.⁴

Turions (winter buds) are ellipsoidal, 5-7 mm, sometimes 9 mm, and develop along the stolons in fall, then detach and sink to the bottom where they remain dormant.² Turions germinate in the spring, initially producing a single root,¹ then float to the surface to mature. A single plant can produce about 100 turions per year.²

Leaves are leathery, glabrous, 2.5 to 5 cm wide and can be round or heart-shaped.² The undersides bear conspicuous aerenchyma cells (air-filled cells which aid in floatation) near the midvein, and all veins originate from the leaf base.¹ Leaf undersides can be dark purple to red in colour.² Petioles are 6 to 14 cm long and bear

two stipules up to 2.5 cm at the petiole base.¹

Flowers are dioecious and borne on different plantlets.² Flowers are produced between July and August. Male flowers arise from a spathe consisting of two bracts 1-1.2 cm long, and borne on a peduncle 0.7-5.5 cm long.¹ Each spathe bears 2-5 flowers with three rounded, white petals 9-19 mm long. Sepals are greenish-white and 4-5.5 mm long.¹

Female flowers are borne on peduncles up to 9 cm long, sepals greenish-white and 4-5 mm long, petals rounded 10-15 mm long, and white, sometimes with a faint pink tinge.¹ Seeds, if produced, are elliptic, about 1 mm long, and densely covered with stout, blunt processes in a spiral pattern.¹ Despite profuse flowering during the summer, European frogbit rarely produces seeds and relies on vegetative reproduction.²

The centers of both male and female flowers (stamen, anthers, stigma) are yellow.²

Prevention:

Learn to recognize European frogbit and do not grow it - in a pond or aquarium. The main cause of new introductions is horticultural escapes and transport on water recreational equipment.³ European frogbit is widely available on the internet.³ Never empty any contents of an aquarium into natural water bodies. Prevention is key as European frogbit infestations are extremely difficult and costly to control;³ eradication is likely not

possible.

Plants, stolon buds, and turions are spread by water currents as well as animals.³ Plant material clinging to water recreational equipment also facilitates spread.¹ Upon leaving a water body check all equipment (propellers, trailers, flotation vests, etc.), clothing, and pets for plant material and leave it at the site. Any material discovered after leaving the site should be disposed of in garbage.

Control:

Mechanical - Small scale hand raking in spring provides temporary control.¹ All plant material should be disposed of in landfill-bound garbage. Draw-down of water bodies where possible and desiccation is effective.¹

A shading experiment under greenhouse conditions found high levels of shade did provide a measure of control.⁵

Chemical - Currently there is no herbicide registered for use on *H. morsus-ranae* in Canada. Pesticide use in water bodies requires special certification and permits. Always check product labels to ensure a herbicide is registered for use on the target plant in Canada by the Pesticide Management Regulatory Agency.

Biological - None researched to date.

European Frogbit *(continued)*



aquariumbg.com/abitat



aphotoflora.com/leaf

REFERENCES:

1. Global Invasive Species Database (GISD) 2015. Species profile *Ameiurus nebulosus*. www.iucngisd.org/gisd/species.php?sc=612 Accessed: March 30, 2017.
2. Global Invasive Species Database (GISD) 2015. Species profile *Hydrocharis morsus-ranae*. www.iucngisd.org/gisd/species.php?sc=862 Accessed: February 2, 2018.
3. Datasheet report for *Hydrocharis morsus-ranae*. Invasive Species Compendium. www.cabi.org/isc/datasheetreport?dsid=28140 Accessed: February 6, 2017.
4. Nault, M.E. and A. Mikulyuk. 2009. European Frog-bit (*Hydrocharis morsus-ranae*): A Technical Review of Distribution, Ecology, Impacts, and Management. Wisconsin Department of Natural Resources Bureau of Science Services, PUB-SS-1048 2009. Madison, Wisconsin, USA.
5. Bin Zhu, Michael S. Ellis, Kelly L. Fancher, Lars G. Rudstam. Shading as a Control Method for Invasive European Frogbit (*Hydrocharis morsus-ranae* L.). 2014. <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0098488>. Accessed: February 3, 2017.