white waterlily

Nymphaea odorata ssp. *odorata* Ait.

Synonyms: *Castalia lekophylla* Small, *C. minor* (Sims) Nyar, *C. odorata* (Ait.) Wood, *C. reniformis* DC., *Nymphaea minor* (Sims) DC., *N. odorata* var. *gigantea* Tricker, *N. odorata* var. *godfreyi* Ward, *N. odorata* var. *minor* Sims, *N. odorata* var. *rosea* Pursh, *N. odorata* var. *stenopetala* Fern., *N. odorata* var. *villosa* Caspary
Other common names: fragrant waterlily, American waterlily, American white waterlily
Family: Nymphaeaceae

Invasiveness Rank: 80 The invasiveness rank is calculated based on a species' ecological impacts, biological attributes, distribution, and response to control measures. The ranks are scaled from 0 to 100, with 0 representing a plant that poses no threat to native ecosystems and 100 representing a plant that poses a major threat to native ecosystems.

Description
White waterlily is an aquatic, perennial plant with floating leaves and branched, creeping rhizomes. The rhizomes are densely covered with short black hairs and are about 2 ½ cm in diameter. Mature leaves are often round, smooth, and up to 30 ½ cm in diameter. They are frequently purple on the lower surface and have a slit on one side. Straight, flexible stalks attach leaves and flowers to thick, submerged rhizomes. Flowers are borne at or slightly above the surface of the water. They are showy, large, fragrant, up to 6 across, and white or pink with yellow centers. Each flower has 17 to 43 petals. After fertilization, the stalk spirals, drawing the flower underwater. Fruits are berry-like capsules that measure about 2 ½ cm across. They have numerous small seeds that are each up to 2 mm long (Hitchcock and Cronquist 1990, Stone 1993, eFloras 2008).

Nymphaea odorata ssp. *odorata* Ait. Photo by G. Lovell.

Similar species: White waterlily can be distinguished from other large, aquatic plants by its very fragrant flowers and big, rounded leaves. Flowers of the native dwarf waterlily (*Nymphaea tetragona*) are not fragrant and have 10 to 17 petals each. Dwarf waterlily leaves are elliptic-oval and not longer than 13 cm. The native yellow pond-lily (*Nuphar lutea*) has yellow flowers and oblong or heart-shaped leaves. Unlike white waterlily, watershield (*Brasenia schreberi* J.F. Gmel.) has petioles that attach to its leaves in the center of the blades (Hultén 1968, Hitchcock and Cronquist 1990, DiTomaso and Healy 2003, eFloras 2008).

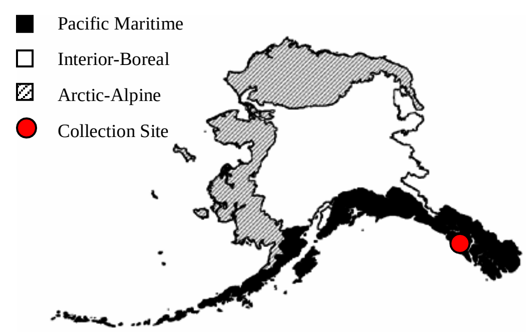
Ecological Impact
Impact on community composition, structure, and interactions: White waterlily tends to form dense, floating mats of vegetation. These mats prevent light from reaching native aquatic plants (Washington Department of Ecology 2005). The distribution of white waterlily mats influences the distribution of phytoplankton, zooplankton, aquatic insect, and fish populations (Moore et al. 1994, Frodge et al. 1995). White waterlily provides important habitats for fish, frogs, and invertebrates. Declines in the positive influences of white waterlily cover on fish reproduction occur once more than 40% of the water's surface area has been covered. Wildlife, including beaver, moose, muskrat, porcupine, and deer, eat white waterlily leaves and roots. Waterfowl eat the seeds of white waterlily (Washington Department of Ecology 2005). Aquatic and semi-aquatic insects use this species both for habitat and food (Cronin et al. 1998, Dorn et al. 2001). Beetles and bees have been observed visiting the flowers of white waterlily. Dead insects were frequently found in flowers of white waterlily in studies of flower pollination (Schneider and Chaney 1981). Extracts from leaf petioles and rhizomes have allelopathic potential, indicating that this species may suppress the germination and growth of other aquatic species (Spence 1998, Quayyum et al. 1999). Noxious plants such as hydrilla (*Hydrilla verticillata*) can also be introduced to lakes when white waterlilies are planted (Moore et al. 1994, Washington Department of Ecology 2005).
Impact on ecosystem processes: Extensive infestations of white waterlily may alter water quality by creating low oxygen conditions beneath the canopy or by changing nutrient dynamics, pH levels, or light regimes (Moore et al. 1994). Dense infestations may

accelerate the natural siltation process in shallow bodies of water. White waterlily can clog irrigation ditches or streams, retarding water flow and accelerating water loss through transpiration (Else and Riemer 1984). Infestations of waterlily may promote the growth and reproduction other exotic species, such as carp, which has the ability to tolerate low oxygen conditions (Moore et al. 1994, Frodge et al. 1995).

Biology and Invasive Potential
Reproductive potential: White waterlily reproduces by seeds and rhizomes (Washington Department of Ecology 2005).
Role of disturbance in establishment: Disturbances, such as the removal of leaves, will lead to abundant seed germination (Welker and Riemer 1982, Else and Riemer 1984).
Potential for long-distance dispersal: Seeds have the ability to float for a number of days because they retain air. Seeds are transported to other areas and other lakes by water currents. They survive ingestion and can be transported by ducks that eat the seeds (Schneider and Chaney 1981, Washington Department of Ecology 2005).
Potential to be spread by human activity: White waterlily is an extremely popular plant for cultivation in ornamental ponds. Many cultivars with color variations have been developed and can be obtained at nurseries. This species has been intentionally introduced into many lakes (Washington Department of Ecology 2005).
Germination requirements: Seed germination of white waterlily requires light and the presence of ethylene gas. The production of ethylene is stimulated when seeds are crowded together. Germination is enhanced by cold stratification for several months. Seedlings are rarely observed in the field when the adult population is high. A large number of seeds germinate, however, after the removal of adult plants, which allows enough light to reach the seeds to break seed dormancy and stimulate germination (Else and Riemer 1984, DiTomaso and Healy 2003).
Growth requirements: White waterlily grows in both acid and alkaline waters when the water depth is 213 cm or less (Sinden-Hempstead and Killingbeck 1996, Wiersema 1997).
Congeneric weeds: Yellow waterlily (*Nymphaea mexicana*) is listed as a noxious weed in California (USDA 2002, Invaders 2010).

Legal Listings
☐ Has not been declared noxious
☐ Listed noxious in Alaska
☒ Listed noxious by other states (WA)
☐ Federal noxious weed
☐ Listed noxious in Canada or other countries

Distribution and abundance
Native and current distribution: White waterlily is native to the eastern half of North America, including southern Canada. It has been introduced as an ornamental in many parts of the world, and it is expected to expand its range in the future. This species grows in ponds, shallow lakes, ditches, swamps, and slow streams (Wiersema 1997, Washington Department of Ecology 2005, Woods 2005). White waterlily has been collected in Southeast Alaska from a muskeg pool on Baranof Island near Sitka (UAM 2005). This individual plant still remains in the pool (M. Shephard – pers. comm.).



Distribution of white waterlily in Alaska

Management
White waterlily can be controlled by cutting, harvesting, covering with bottom barrier materials, and applying aquatic herbicides (Welker and Riemer 1982, Washington Department of Ecology 2005). Persistent picking of emerging leaves every other day over the course of two to three growing seasons will eventually kill the plants. After control treatments, dead and decomposing leaves and rhizomes may form floating mats in the lake. Removing all dead materials from the water is recommended. There are no effective biological control agents available at this time for white waterlily (Washington Department of Ecology 2005).

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