

Howellia (*Howellia aquatilis*)



THREATENED



Flowers (left), habit (center), and habitat (right) of howellia. Photos by Kristi DuBois (left) and Scott Mincemoyer (Montana Natural Heritage Program, center and right). If downloading images from this website, please credit the photographer.

Family

Campanulaceae

Plant description

Howellia is a delicate, glabrous aquatic annual with a flaccid, somewhat fistulose stem. Plants are 10-70 cm long, rooted, naked below, and branched above, the branches spreading or floating. Leaves are narrowly linear, mostly entire or with a few slender teeth, flaccid, and 1-4.5 cm long by up to 1.5 mm wide. Early flowers are submerged, cleistogamous (remaining closed), lack a conspicuous corolla, and are located in the axils of ordinary leaves. Later flowers are emergent, borne on specialized branches with shorter and more or less verticillate leaves, and are chasmogamous (opening at maturity), bearing lavender or whitish deeply dorsally cleft and 5-lobed tubular corollas 2-3 mm long. Capsules are 0.5-1.3 cm long.

Distinguishing characteristics

Howellia is vegetatively similar to many other aquatic plant species, particularly those in the genus *Potamogeton*. The distinct flowers of *howellia*, however, readily distinguish it from these other species. *Callitriche heterophylla* is one vegetative look-alike known to co-occur with *howellia*, but the former is distinguished by submergent linear leaves that are usually opposite (versus usually alternate); floating leaves that are broadly ovate (versus linear); and flowers that are always axillary, very inconspicuous, and lack a corolla (versus emergent chasmogamous, petaliferous flowers on special branches in addition to axillary cleistogamous, submersed flowers).

When to survey

Surveys for *howellia* should be completed when the species is in flower and can be readily distinguished from other aquatics. Blooming of emergent flowers typically begins in June, soon after stems reach the water surface, and continues into August, depending on conditions.

Habitat

Howellia occurs mainly in small, vernal, freshwater wetlands and ponds that are usually filled with water in late fall, winter, and early spring, then dry up, at least in part, by the end of the growing season. The species is also found in oxbow sloughs and on the margins of marshy areas. Occupied sites are usually less than a meter deep, although the species has been found in water up to two meters deep. Howellia occurrences are typically bordered by forest, usually including broadleaf deciduous trees, and range from 3-1372 m (10-4501 ft) in elevation.

Associated plant species vary by region. In Montana, *Populus trichocarpa* and to a lesser extent *P. tremuloides* and *Betula papyrifera* are tree species commonly associated with howellia. In Washington, *P. tremuloides* is commonly associated with occurrences in the eastern portion of the state, *Fraxinus latifolia* with occurrences in the western portion. Range-wide, the two most common herbaceous associates are *Carex vesicaria* and *Phalaris arundinacea*, the latter an invasive competitor. Other Oregon associates include *Eleocharis palustris* and *Ludwigia palustris*.

Range

Howellia is endemic to the Pacific Northwest, with occurrences in Oregon, California, Idaho, Montana, and Washington. A 2005 range-wide status assessment of the species determined that there are a total of 214 extant occurrences of howellia, the majority located within three metapopulations: one in the Swan Valley in western Montana, one in Spokane County in eastern Washington, and one in Pierce County in western Washington. Despite a relatively large number of occurrences, the total area occupied by howellia range-wide is estimated at only 285 acres.

The first known collection of the species was made from Sauvie Island along the Columbia River in Multnomah County, Oregon in 1879. Several other Sauvie Island howellia collections were made in the three decades following the discovery of the species, but it is unclear what county they were collected from, as the southern two-thirds of the island is located in Multnomah County, and the northern third is in Columbia County. Additional historic collections of the species were made in Clackamas and Marion Counties, the last one in 1935. The species was long thought to be extirpated from Oregon, until 2002 when it was discovered in Benton County on the William Finley National Wildlife Refuge. The current status of this sole contemporary Oregon occurrence is unknown; botanists surveying the refuge in June 2007 were unable to locate any howellia plants.

Oregon counties

Benton, Clackamas, Marion, Multnomah, possibly Columbia

Federal status

Threatened

Threats

Habitat degradation and loss due to changes in hydrology and invasion by competitive plant species are major threats to the long-term survival of howellia. Seed germination in howellia only occurs when microsites dry out at the end of the growing season and seeds are exposed to air. However, plants depend on sufficient water during the wet season to grow to maturity in the spring and flower and produce new seed. Thus, consecutive years of either particularly wet conditions or particularly dry conditions can significantly limit numbers of viable seed and negatively impact the size of howellia populations. Results from a study at one howellia site indicate that the invasive *Phalaris*

arundinacea (reed canary grass) is gradually displacing howellia and other native marsh vegetation within the study area. Alarming, *P. arundinacea* is found at many howellia sites range-wide. The invasive *Iris pseudacorus* (yellow flag iris) poses a particular threat at howellia sites in western Washington. Additional range-wide threats to howellia include timber harvesting activities, land development, recreation, road construction and maintenance, military activities, grazing, and successional changes in wetland vegetation.

Conservation planning

A U.S. Fish and Wildlife Service [draft Recovery Plan](#) (pdf document, 2.53 MB) was released for howellia in 1996.

Did you know?

Howellia plants begin producing underwater cleistogamous flowers (flowers that self-fertilize without opening) soon after the plants begin growing in the spring, by early April to early May, depending on location and seasonal conditions. Fruits from these submerged flowers form in May and June with seed dispersal beginning in June. Emergent flowers, though chasmogamous and able to cross-pollinate, are almost always self-fertilized, as well. Emergent flowers bloom when the stems reach the water surface, and are usually present from late June until August, with seed dispersal from emergent fruits occurring in late summer. In favorable years, seed production can thus occur over much of the growing season, providing a buffer against dry years when fruit production by emergent flowers is limited.

References

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