Washington Invasive Ranking System

Washington Natural Heritage Program

Veronica anagallis-aquatica (Water Speedwell)

Assessed by
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Ecological Impact Rank: **Insignificant** (29) Confidence: **Moderate** (50)

Management Difficulty Rank: Insignificant (25)	Confidence: Low (10)
Biological Characteristics of Invasiveness: High (74)	Confidence: Moderate (38)
Concern Related to Distribution and Abundance: Moderate (69)	Confidence: High (80)

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Plant Information

Whether or not *Veronica anagallis-aquatica* is introduced to North America is debated. However, this species is known to be introduced in at least some parts of the continent and it is easily spread by human activity (Albach, 2020). Most sources, including the Washington Flora Checklist, treat this species as introduced in Washington. At least some states treat this species as native and even of conservation concern: Nevada ranks it as Vulnerable (S3), Arkansas ranks it as Imperiled (S2), and North Carolina ranks it as Critically Imperiled (S1) (NatureServe, 2024). *Veronica anagallis-aquatica* can be difficult to distinguish from related species (Ellmouni et al., 2018; Hosseinnejad Azad et al., 2021).

Legal Listings

Washington State Weed Board: No

Washington Invasive Species Council: No

WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES

Section 1: Distribution and Abundance

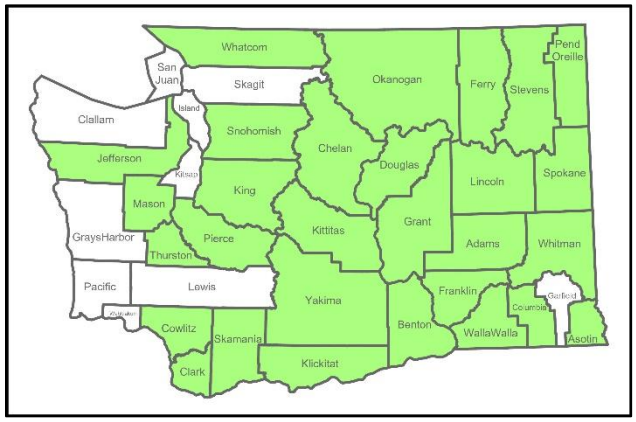

Figure 1. Distribution of counties where *Veronica anagallis-aquatica* has been documented in Washington State (CPNWH, 2024; EDDMapS, 2024; iNaturalist Community, 2024).

Q1: Current Range Size in Washington

Score: High

Confidence: High

Veronica anagallis-aquatica is documented in 29 of 39 (74%) counties in Washington (CPNWH, 2024; EDDMapS, 2024; iNaturalist Community, 2024).

Source: Herbarium records and other observations

Q2: Current Trend in Total Range

Score: Moderate

Confidence: High

Veronica anagallis-aquatica is most common east of the Cascades, however its range may have expanded in the Puget Basin in the last 20 years (CPNWH, 2024; iNaturalist Community, 2024).

Source: Herbarium records and other observations

Q3: Proportion of Potential Range Currently Unoccupied

Score: Low

Confidence: High

Veronica anagallis-aquatica is reported from 74% of counties in Washington. This species is a wetland obligate; in Washington it is found in ditches, canals, lake and river shores, wet meadows, and occasionally as mats of floating vegetation, suggesting it can establish under a variety of conditions (CPNWH, 2024). This species is likely capable of expanding into other counties in Washington.

Source: Herbarium records and other observations

Q4: Local Range Expansion or Change in Abundance

Score: Low

Confidence: Moderate

Based on observations and herbarium records, *Veronica anagallis-aquatica* may be increasing in abundance and expanding its range locally in Washington (CPNWH, 2024; iNaturalist Community, 2024). Records suggest this species is widespread, but only locally abundant in Washington.

Source: Herbarium records and other observations

Q5: Diversity of Ecosystems Invaded

Ecosystem types: Emergent Open Wetland, Bogs & Fens, Forested Wetland, Shallow Water Wetland (Aquatic)

Score: High

Confidence: Moderate

Veronica anagallis-aquatica is an obligate wetland species. This species and its close relatives are phenotypically plastic, allowing it to grow under a wide range of conditions (Ellmouni et al., 2018). *Veronica anagallis-aquatica* frequently grows in water and has both emergent and submerged forms (Boeger & Poulson, 2003; Ellmouni et al., 2018). It is found in wet meadows and standing water, along streambanks and lakesides, and in slow streams, ditches, and irrigation channels (Wetherwax, 2012; Albach, 2020; CPNWH, 2024). This species has been found in a wide range of wetlands in Washington, including vernal pools and other seasonal wetlands, draw down areas of lakes, streams, and rivers, and floating vegetation mats, and on a wide range of substrates, including silt, muck, sand, and cobbles. *Veronica anagallis-aquatica* is frequently found in wetlands in sagebrush steppe and other arid areas, but is expanding into wetter west side habitats (CPNWH, 2024; iNaturalist Community, 2024). In its native

range, this species is also known from estuaries (Ribeiro et al., 2022), suggesting some salt tolerance.

Source: Published research, Professional expertise, Herbarium records and other observations, Flora of North America and Jepson treatments

Section 2: Biological Characteristics

Q6: Aggressive Mode of Reproduction

Score: Yes

Confidence: Low

Veronica anagallis-aquatica reproduces from seed, with reported germination rates between 50–100% (SID, 2023). This species can also reproduce vegetatively via rhizomes, stolons, and fragments (Riis et al., 2004; DiTomaso et al., 2013), but means of reproduction in this species are not very different from reproduction of co-occurring native species (Stromberg & Chew, 1997).

Sexual reproduction is usually by selfing, but *V. anagallis-aquatica* can also be pollinated by small insects. A study from Iran found an average of approximately 30–45 seeds per capsule in this species (Hosseinnejad Azad et al., 2021). Seed production information from invasive populations of *V. anagallis-aquatica* were not found. Plants have both emergent and submerged forms, but only emergent individuals can reproduce sexually (Boeger & Poulson, 2003).

A study from New Zealand found *V. anagallis-aquatica* to be a primary colonizer on bare sediment in streams, suggesting a high level of propagule production, strong dispersal abilities, and/or efficient establishment capabilities. This study also observed a high number of seedlings after *V. anagallis-aquatica* flowered, suggesting a high rate of germination (Riis et al., 2004).

Source: Published research, Informal publication, Seed Information Database

Q7: Innate Potential for Long-Distance Dispersal

Score: Yes

Confidence: Moderate

Veronica anagallis-aquatica propagules can be transported by water, and its seeds germinate readily (Boeger & Poulson, 2003; DiTomaso et al., 2013). A study from New Zealand found *V. anagallis-aquatica* to be a primary colonizer on bare sediment in streams, suggesting strong dispersal abilities, or efficient establishment capabilities (Riis et al., 2004).

Source: Published research, Informal publication

Q8: Potential to be Spread by Human Activities

Score: Yes

Confidence: High

Veronica anagallis-aquatica is easily transported by human activity, particularly in mud attached to shoes or equipment (Albach, 2020; Hosseinnejad Azad et al., 2021).

Source: Published research, Flora of North America treatment

Q9: Allelopathy

Score: Yes

Confidence: Low

Veronica anagallis-aquatica has a history of use as a medicinal plant and produces saponins, among many other secondary compounds, which may be allelopathic (Coelho et al., 2010; Shahzad et al., 2011). However, no sources directly addressed allelopathy or chemical defenses in this species.

Source: Published research, Professional expertise

Q10: Competitive for Limiting Abiotic Factors

Score: Yes

Confidence: Low

In a study from New Zealand, this species became dominant when establishing on bare substrate and prevented other species from establishing, suggesting that it is capable of outcompeting co-occurring species (Riis et al., 2004).

Source: Published research

Q11: Growth Form

Score: No

Confidence: Low

Veronica anagallis-aquatica is capable of growing in dense stands, and can impede stream flow (DiTomaso et al., 2013). While no information was available on *V. anagallis-aquatica*'s effects on light availability, emergent plants can shade out aquatic plants (Riis et al., 2004).

Source: Published research, Informal publication

Q12: Germination Requirements

Score: Unknown

Confidence: Not Rated

No information was found on *Veronica anagallis-aquatica*'s ability to germinate without disturbance providing an open substrate.

Source:

Q13: Invasiveness of Other Plants in Genus

Score: Yes

Confidence: Moderate

Veronica is a genus of over 400 species with a wide range of life histories. Many species of *Veronica* are described as weedy (Ellmouni et al., 2018). While *Veronica anagallis-aquatica* is not designated as an invasive species in North America, it is designated as invasive in Japan (Saito & Kadono, 2021), demonstrating the ability to become invasive under the right conditions. *Veronica beccabunga* has also been introduced to North America, but has not spread significantly; it may be unable to establish where the closely related native *Veronica americana* is present (Ellmouni et al., 2018).

Source: Published Research

Q14: Shade Tolerance

Score: Moderate

Confidence: High

Veronica anagallis-aquatica is frequently observed in full sun, but at least some observations in Washington are from partial shade or in areas shaded by other plants (CPNWH, 2024). A study from Idaho on the morphological differences between emerged and submerged *V. anagallis-aquatica* found that above water leaves were morphologically similar to terrestrial species adapted to full sun, and submerged leaves were morphologically similar to shade-adapted species (Boeger & Poulson, 2003). This suggests that *V. anagallis aquatica* is adaptable to both sunny and partially shaded conditions.

Source: Published research, Herbarium records

Q15: Disturbance Tolerance

Score: Yes

Confidence: High

In Washington, *Veronica anagallis-aquatica* occurs with increaser (e.g., *Typha latifolia*) or invasive species (particularly *Phalaris arundinacea*), and in draw down areas of lakes and streams, wet ditches, irrigation channels, disturbed soil, wet areas in degraded shrub steppe, and areas of heavy cattle grazing (CPNWH, 2024). It was also an early colonizer of disturbed areas in studies from New Zealand (Riis et al., 2004).

Source: Published research, Herbarium records

Q16: Propagule Persistence

Score: <5 years

Confidence: Low

Little information is available on seed longevity, but they are not expected to remain in the seed bank for more than a few years (DiTomaso et al., 2013).

Source: Informal publication

Q17: Palatability

Score: No, plant is palatable

Confidence: Moderate

This plant has historically been used as both food and medicine by humans (Shahzad et al., 2011). Grazer desirability is unknown.

Source: Published research

Section 3: Ecological Impact

Q18: Impact on Ecosystem Abiotic Processes

Abiotic Processes: Nutrient dynamics, Light availability, Chemistry

Score: Low

Confidence: Moderate

Occasionally, dense stands of *Veronica anagallis-aquatica* may impede stream flow (DiTomaso et al., 2013). *Veronica anagallis-aquatica* is potentially an effective bioaccumulator, with studies showing that it can immobilize metals such as cadmium and lead (Ribeiro et al., 2022). This species is also capable of removing nitrates from eutrophic water sources (Bannister et al., 2021). It also potentially reduces light availability for aquatic species (Riis et al., 2004). *Veronica anagallis-aquatica*'s ability to uptake heavy metals and excessive nitrates could potentially have a positive effect on abiotic processes, and several studies have been done to test the potential of this species for phytoremediation (e.g., Ribeiro et al., 2022).

Source: Published research

Q19: Impact on Ecosystem Structure

Score: Insignificant

Confidence: High

Little information was available on how *Veronica anagallis-aquatica* might impact ecosystem structure. Dense stands of *V. anagallis-aquatica* may at least occasionally impede stream flow (DiTomaso et al., 2013) and emergent plants can shade out submerged or aquatic plants (Riis et al., 2004). However, any minor structural impacts from *V. anagallis-aquatica* are likely to be short-lived.

Source: Published research, Informal publication, Professional expertise

Q20: Impact on Ecosystem Composition

Score: Low

Confidence: High

Little information was available on *Veronica anagallis-aquatica*'s impact on ecosystem composition. It may shade out aquatic vegetation in some ecosystems (Riis et al., 2004), potentially reducing species diversity. However, *V. anagallis-aquatica* is often observed in naturally low-diversity ecosystem types (such as Columbia Plateau Basin Marshes).

Source: Published research, Professional expertise

Q21: Impact on Particular Native Species

Score: Unknown

Confidence: Not Rated

Veronica anagallis-aquatica has been studied as a bioaccumulator and can immobilize heavy metals such as cadmium. This could potentially have a negative effect on species that feed on *V. anagallis-aquatica* and concentrate heavy metals up the food chain (Ribeiro et al., 2022).

A study in Japan found potential pollinator competition between *V. anagallis-aquatica* and a co-occurring native *Veronica* species (Saito & Kadono, 2021), though more research is needed to conclusively show that pollinator competition was the factor resulting in decreased seed set in both species.

Source: Published research

Q22: Observed Ability to Invade Undisturbed Ecosystems

Score: Low

Confidence: Moderate

This plant is occasionally observed in laggs surrounding bogs, but generally only when hydrological conditions have been altered. It may establish in relatively undisturbed aquatic systems. However, this species is most frequent in naturally disturbed ecosystems such as riparian areas, or basin marshes that have large water-level fluctuations.

Source: Professional expertise

Q23: Observed Ability to Invade Naturally Disturbed Ecosystems

Score: Yes

Confidence: High

This species is common in naturally and anthropogenically disturbed wetlands. A study testing colonization of stream channels in New Zealand found that *Veronica anagallis-aquatica* was one of the first colonizers and remained the dominant species for the first 60–80 weeks in artificial stream reaches (simulating reaches disturbed by floods). This study started with bare substrate, and all propagules arrived from upstream (Riis et al., 2004).

Source: Published research, Professional expertise

Section 4: Management Difficulty

Q24: General Management Difficulty

Score: Unknown

Confidence: Not Rated

Very little information was available on the treatment of *Veroncia anagallis-aquatica* populations. Mechanical removal techniques such as pulling require care not to disperse plant fragments, which can start new populations. Herbicides have not been tested for this species, but herbicides that are effective against other *Veronica* species are likely to also work on *V. anagallis-aquatica* (DiTomaso et al., 2013).

Source: Informal publication

Q25: Minimum Time Commitment

Score: Unknown

Confidence: Not Rated

No information was available on the amount of time treatment of *Veronica anagallis-aquatica* populations might take. A general minimum time for treatment is the lifespan of the propagules, which is likely less than five years, but other factors, such as likelihood of reinvasion from other source populations, is also important to consider.

Source:

Q26: Impacts of Management on Native Species

Score: Unknown

Confidence: Not Rated

No information was available on the effects treatment of *Veronica anagallis-aquatica* might have on native species. Herbicides are likely the most effective treatment available for this species (DiTomaso et al., 2013). Effects of herbicide treatment on co-occurring species likely depend on if herbicide application can be targeted to just *V. anagallis-aquatica* or not. Reduction in *V. anagallis-aquatica* populations could have positive effects on neighboring native plants, potentially reducing pollinator interference (Saito & Kadono, 2021) and competition for light (Riis et al., 2004).

Source: Published research, Informal publication

Q27: Inaccessibility of Invaded Areas

Score: Low

Confidence: Low

This plant can spread easily in riparian systems, so at least some populations are likely difficult to access.

Source: Professional expertise

Q29: Sociopolitical Implications of Management

Score: Insignificant

Confidence: Moderate

Objections to potential management are unlikely, aside from generalized skepticism of herbicides (particularly in wetland and aquatic systems).

Source: Professional expertise

Additional Comments

None

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