

Washington Invasive Ranking System

Washington Natural Heritage Program

Phalaris arundinacea (Reed Canarygrass)

Assessed by

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Ecological Impact Rank: **High** (81)

Confidence: **Moderate** (58)

Management Difficulty Rank: High (93)

Confidence: High (80)

Biological Characteristics of Invasiveness: High (83)

Confidence: High (79)

Concern Related to Distribution and Abundance: High (76)

Confidence: High (90)



Photo Credit: Thayne Tuason 2011, used under Creative Commons license (Burke Herbarium, University of Washington, 2024).

Ranking Notes

There are at least 11 cultivars of *Phalaris arundinacea*. This species has a circumboreal distribution. While native to North America, it is likely that all populations present have experienced at least some gene flow from introduced European genotypes (Magee et al., 1999). If any native genotypes of *Phalaris arundinacea* remain in the Pacific Northwest, it is likely safe to assume that populations exhibiting invasiveness likely represent introduced genotypes (Magee et al., 1999; Lavergne & Molofsky, 2004; Waggy, 2010).

Phalaris arundinacea was assessed by multiple individuals. Range of assessor ratings is provided in parentheses following the final assigned rating.

Legal Listings

[Washington State Weed Board](#): List C

[Washington Invasive Species Council](#): No

Section 1: Distribution and Abundance



Figure 1. Distribution of counties where *Phalaris arundinacea* has been documented in Washington State (CPNWH, 2023; EDDMapS, 2023; iNaturalist Contributors, 2023).

Q1: Current Range Size in Washington

Rating: High

Confidence: High

Phalaris arundinacea has been documented in all 39 counties in Washington State (100%) (CPNWH, 2023; EDDMapS, 2023; iNaturalist Contributors, 2023).

Source: Professional expertise, Herbarium records and other observations

Q2: Current Trend in Total Range

Rating: Low

Confidence: High

Phalaris arundinacea has already expanded to all 39 counties in Washington State (100%) (CPNWH, 2023; iNaturalist Contributors, 2023; Jarnevich et al., 2023). Based on herbarium records, it is possible that this species spread to the Olympic Peninsula in the last 20 years (CPNWH, 2023).

Source: Professional Expertise, Herbarium records and other observations, USGS dataset

Q3: Proportion of Potential Range Currently Unoccupied

Rating: Insignificant (range Insignificant - Low)

Confidence: Moderate (range Moderate - High)

Phalaris arundinacea is especially common in the Pacific Northwest (Waggy, 2010). This species has been documented in all 39 counties in Washington state (100%), and appears to occur throughout the suitable habitat available in Washington (CPNWH, 2023; iNaturalist Contributors, 2023; Jarnevich et al., 2023).

Source: Informal publication, Professional expertise, Herbarium records and other observations, USGS dataset

Q4: Local Range Expansion or Change in Abundance

Rating: High (range Low - High)

Confidence: High (range Moderate - High)

Based on herbarium records *Phalaris arundinacea* may already occupy a large portion of its available habitat in Washington. The largest increases in local abundance appear to be in the northwestern portion of the state, including the Olympic Peninsula, but increases in abundance and range appear to be somewhat constrained in the last 20 years (CPNWH, 2023).

Source: Professional expertise, Herbarium records

Q5: Diversity of Ecosystems Invaded

Ecosystem Types: Forest & Woodland, Emergent Open Wetland, Bogs & Fens, Forested Wetland

Rating: High

Confidence: High

Phalaris arundinacea is usually found in wetlands, including wet meadows, marshes, peatlands, and riparian areas, where it frequently makes up 50–100% of the vegetation cover. This species is more occasionally found in uplands (Lavergne & Molofsky, 2004; Waggy, 2010).

Source: Published research, Informal publication, Professional expertise

Section 2: Biological Characteristics

Q6: Aggressive Mode of Reproduction

Rating: Yes

Confidence: High



Phalaris arundinacea is a long-lived rhizomatous perennial. This species increases in established populations via rhizomes and tillers and colonizes new areas via seed. Plants can produce rhizomes in less than two months. Individual rhizomes can grow up to four inches long in wet soils and form dense mats. One experimental garden study found 383 feet of rhizomes growing in one square meter of loam. Plants are also capable of rooting from their stem nodes (Mueller, 1941). Rhizomes can account for up to 74% of new tillers in a *P. arundinacea* population, with the rest of the tillers coming from buds in aboveground leaf axils. *Phalaris arundinacea* can also sprout via fragments and recovers quickly after mowing and other damage (Waggy, 2010).

Phalaris arundinacea is wind-pollinated and is an obligate outcrosser. Seed production can reach 1000 seeds per square meter, with individual inflorescences documented producing up to 600 seeds in the Pacific Northwest (Lavergne & Molofsky, 2004; Waggy, 2010).

Repeated introductions of *P. arundinacea* cultivars from Eurasia have resulted in high genetic diversity in North American populations. High genetic diversity and novel genotypes makes *P. arundinacea* especially adaptable to new conditions. Differences in invasive potential between populations is likely due to this genetic diversity (Lavergne & Molofsky, 2004; Waggy, 2010).

Source: Published research, Informal publication, Professional expertise

Q7: Innate Potential for Long-Distance Dispersal

Rating: Yes

Confidence: Moderate

Phalaris arundinacea seeds naturally disperse via gravity, water, animals, and potentially wind (Waggy, 2010). Seeds can remain buoyant in water for a few days (Waggy, 2010). Seeds are also capable of adhering to animals and have been found in the feet and feathers of waterfowl, suggesting that this species has good potential for long distance dispersal (Waggy, 2010).

Source: Informal publication, Professional expertise

Q8: Potential to be Spread by Human Activities

Rating: Yes

Confidence: High

Phalaris arundinacea seeds are capable of adhering to humans and machinery, allowing for long distance dispersal (Waggy, 2010). This species is also purposely spread for revegetation, soil stabilization, phytoremediation, and waste water management, as well as for livestock forage (Lavergne & Molofsky, 2004).

Phalaris arundinacea is occasionally recommended for erosion control and revegetation, including in dozer lines and burned sites, and it is being grown as a biofuel crop, particularly in Europe (Waggy, 2010). However, its ability to dominate makes it a poor choice for revegetation, cultivation, or other projects (Waggy, 2010).

Source: Published research, Informal publication, Professional expertise

Q9: Allelopathy

Rating: No

Confidence: Moderate

Phalaris arundinacea shows little allelopathic effects on *Medicago sativa*, *Trifolium pratense*, and *Festuca arundinacea*, suggesting this species is not allelopathic, but more research is needed (Lavergne & Molofsky, 2004).

Source: Published research

Q10: Competitive for Limiting Abiotic Factors

Rating: Yes

Confidence: High

Phalaris arundinacea exhibits a suite of traits that make it a highly effective competitor (Lavergne & Molofsky, 2004). Phenotypic plasticity allows *P. arundinacea* to adapt to changing biotic and abiotic conditions and tolerate a wide variety of environmental conditions (Lavergne & Molofsky, 2004). This species stores carbohydrates in its roots, allowing it to start growing earlier in the spring than co-occurring native species (Lavergne & Molofsky,



2004). The extensive root system is effective at nutrient uptake and is water efficient, Relationships with mycorrhizal fungi are also likely to increase its competitiveness for resources, including water (when it occurs in drier habitats) (Lavergne & Molofsky, 2004). Native vegetation communities have demonstrated reduced root growth in mesocosm experiments when grown with *P. arundinacea* (Lavergne & Molofsky, 2004).

Source: Published research, Professional expertise

Q11: Growth Form

Rating: Yes

Confidence: High

Phalaris arundinacea grows rapidly and forms dense monotypic stands and swards that can make up 50–100% of the vegetation cover where found (Lavergne & Molofsky, 2004; Waggy, 2010). The height and growth form of this species allow it to effectively shade out neighboring plants (Lavergne & Molofsky, 2004). Experiments in prairie pothole communities suggest that *P. arundinacea* is more competitive for light than even *Typha latifolia* and other species with similar growth forms (Lavergne & Molofsky, 2004; Waggy, 2010).

Source: Published research, Informal publication, Professional expertise

Q12: Germination Requirements

Rating: Yes

Confidence: Moderate

While *Phalaris arundinacea* takes advantage of disturbance to establish, it is not required. Seedlings are most likely to grow in open areas like mudflats or flood plains, and rapidly develop rhizomes and tillers (Waggy, 2010). Saturated soil and exposure to light increases germination, and at least some research suggests that this species requires light to germinate (Kim et al., 2006).

Source: Published research, Informal publication, Professional expertise

Q13: Invasiveness of Other Plants in Genus

Rating: Yes

Confidence: High

The genus *Phalaris* consists of 20 species, from narrow endemics to cosmopolitan invasives. *Phalaris arundinacea* appears to be the most invasive of these species, occurring many places outside its native range, but *Phalaris aquatica* and *Phalaris minor* are also invasive in some places (Kim et al., 2006; Voshell et al., 2015; Xu et al., 2019). *Phalaris canariensis* is occasionally documented in Washington State (Weinmann et al., 2002).

Source: Published research, Professional expertise

Q14: Shade Tolerance

Rating: Low/Insignificant

Confidence: Moderate

Phalaris arundinacea prefers full sun but can occur in partially shaded and shaded areas. This species commonly dominates the understory of riparian forests and woodlands. Seedlings can also establish in shade, though not as easily or as successfully as they do in full sun. Some research suggests that *P. arundinacea* needs light to germinate, and development of dense canopies can reduce the number of sites available for seedling germination. *Phalaris arundinacea* also usually has much reduced biomass and rhizome survival in shaded areas (Kim et al., 2006; Waggy, 2010).

In an experiment planting willow stakes to try to shade out *P. arundinacea* at a site on Lake Washington, dense plantings of willow cuttings taken from nearby willow trees were able to significantly reduce *P. arundinacea* biomass. This result was likely due to the willow outcompeting the *P. arundinacea* for light, though other mechanisms of competition cannot be ruled out (Kim et al., 2006).

Source: Published research, Informal publication, Professional expertise

Q15: Disturbance Tolerance

Rating: Yes

Confidence: High

Phalaris arundinacea occurs across successional communities, though it appears to be most common in early to mid-succession communities. Disturbance likely benefits this species. *Phalaris arundinacea* frequently invades after human or natural disturbances in both its native and invasive ranges. This includes moving into areas after the removal of other invasive species (e.g., *Lythrum salicaria*, purple loosestrife). Addition of nitrogen to wetlands due to human activities also likely increases the invasive capacity of this species (Lavergne & Molofsky, 2004; Waggy, 2010).

Source: Published research, Informal publication, Professional expertise

Q16: Propagule Persistence

Rating: >10 Years

Confidence: High

Phalaris arundinacea likely does form a significant seed bank, with densities between 100–5000 seeds per meter. Studies have found that seeds can survive up to 20 years. Seeds in inundated soil stay viable for longer than seeds floating in water (Waggy, 2010). This species can also apparently survive decades of mowing without exhausting its root resources (NRCS, 2003)

P. arundinacea germination is highly variable, with rates ranging from 3–93% (Kim et al., 2006). The drivers of this variability are unclear but may include genetic variability or poor curing/storage of seed (Kim et al., 2006). Saturated soil and exposure to light increases germination, and at least some research suggests that this species requires light to germinate (Kim et al., 2006). The seeds can germinate immediately after ripening, but they are also capable of dormancy (Lavergne & Molofsky, 2004) and whether seeds germinate immediately in natural conditions is unknown (Waggy, 2010).

Source: Informal publication, Professional expertise

Q17: Palatability

Rating: No, plant is palatable

Confidence: Moderate

Phalaris arundinacea has been cultivated as forage for both livestock and wildlife (Lavergne & Molofsky, 2004; Waggy, 2010). In some studies, *P. arundinacea* has been preferred over other pasture grasses by horses and geese, but palatability and nutritional value may depend on age and variety (Waggy, 2010). Some varieties of this species may contain enough alkaloids to render them potentially toxic, but because *P. arundinacea* was introduced to North America as a forage species, it may have fewer alkaloids than in its Eurasian range (Lavergne & Molofsky, 2004; Waggy, 2010). Wildlife has been observed to occasionally forage on this species, but its importance to any of the animals seen to consume it is unknown (Lavergne & Molofsky, 2004; Waggy, 2010).

Insect diversity is frequently lower in wetlands dominated by *P. arundinacea* and fewer insects feed on this species than on native species (Lavergne & Molofsky, 2004). Plants frequently produce secondary compounds like alkaloids as a defense against herbivory, so *P. arundinacea* may be better defended against insect damage and disease than its native competitors.

Source: Published research, Informal publication, Professional expertise

Section 3: Ecological Impact

Q18: Impact on Ecosystem Abiotic Processes

Abiotic Processes: Fire, Geomorphology, Hydrology, Light availability, Nutrient dynamics

Rating: High (range Moderate - High)

Confidence: Moderate (range Low - High)

Several sources note that *Phalaris arundinacea* is capable of changing stream channels, narrowing and slowing flows by capturing silt and debris with its roots and stems (Lavergne & Molofsky, 2004; Waggy, 2010). These changes may impede or halt abiotic processes like scouring that are important for maintaining salmon habitat (Lavergne & Molofsky, 2004; Waggy, 2010). *Phalaris arundinacea* can also



alter soil structure and organic content, which can in turn change the species composition of the vegetation community (Lavergne & Molofsky, 2004). Its dense, tall growth habit also alters the light regime for neighboring plant species (Lavergne & Molofsky, 2004; Waggy, 2010). No specific information was found regarding the length or irreversibility of these impacts but given the difficulty of treating occurrences of this species, it seems reasonable to rate it as causing major potentially irreversible changes to the abiotic system.

Source: Published research, Informal publication, Professional expertise

Q19: Impact on Ecosystem Structure

Rating: Moderate (range Moderate - High)

Confidence: Moderate (range Moderate - High)

Phalaris arundinacea readily converts bunchgrass-dominant wet meadows and prairies to rhizomatous meadows/marshes. *Phalaris arundinacea* may change ecosystem successional patterns and prevent establishment of woody species. These structural changes may have a negative effect on salmon, particularly by reducing riparian insect abundance and therefore available food for immature salmon (Waggy, 2010).

Source: Informal publication, Professional expertise

Q20: Impact on Ecosystem Composition

Rating: High

Confidence: High

Studies from Oregon and Wisconsin found that *Phalaris arundinacea* reduced community diversity and changed vegetation composition in wetlands (Waggy, 2010). This species reduces community diversity over time by displacing native species, with reportedly greater negative effects on graminoids than on forbs (Lavergne & Molofsky, 2004). *Phalaris arundinacea* also displaces even historically dominant native species (Lavergne & Molofsky, 2004).

While *Phalaris arundinacea* may provide cover for a number of animal species, including wild ungulates,

birds, fish and amphibians, only northern leopard frogs appear to prefer it over native vegetation (Waggy, 2010).

Source: Published research, Informal publication, Professional expertise

Q21: Impact on Particular Native Species

Rating: Unknown

Confidence: Not Rated

Phalaris arundinacea may have greater impact on co-occurring graminoids than forbs (Lavergne & Molofsky, 2004). This species also potentially displaces rare native plants in the Pacific Northwest, including *Sidalcea nelsoniana* and *Howellia aquatilis*, which both occur in Washington (Lavergne & Molofsky, 2004; Waggy, 2010). However, it seems likely that these rare taxa are being displaced as part of a community as opposed to being more vulnerable than co-occurring species to *P. arundinacea* encroachment.

Source: Published research, Informal publication, Professional expertise

Q22: Observed Ability to Invade Undisturbed Ecosystems

Rating: Moderate (range Moderate - High)

Confidence: Moderate

Phalaris arundinacea is described as an aggressive invader by multiple sources and does not require disturbance to establish (Magee et al., 1999; Waggy, 2010).

Source: Published Research, Informal Publication, Professional Expertise

Q23: Observed Ability to Invade Naturally Disturbed Ecosystems

Rating: Yes

Confidence: High

Phalaris arundinacea can invade after flooding and other disturbances (Lavergne & Molofsky, 2004; Waggy, 2010).



Source: Published Research, Informal Publication, Professional Expertise

Section 4: Management Difficulty

Q24: General Management Difficulty

Rating: High (range Moderate - High)

Confidence: High (range Moderate - High)

Management of this species is difficult. No single treatment appears to be effective in controlling *Phalaris arundinacea* long-term. Effective treatment needs to have a long-term ecosystem wide approach and ongoing treatments may be needed to manage resprouting, re-invasion, or encroachment by other invasive plant species. The best management for *P. arundinacea* is to prevent its establishment by avoiding disturbance and preserving the integrity of wetlands. Planting woody or long-lived perennial species may be the most effective way to out-compete *P. arundinacea* where it is already established. An integrated approach incorporating multiple treatment options is needed to manage *Phalaris arundinacea* populations (Lavergne & Molofsky, 2004; Kim et al., 2006; Waggy, 2010).

Source: Published research, Informal publication, Professional expertise

Q25: Minimum Time Commitment

Rating: High

Confidence: High

Phalaris arundinacea occurrences are likely to require long term management, unless they are caught early in their invasion (Lavergne & Molofsky, 2004; Waggy, 2010). This species has a persistent seed bank and reinvasion by propagules from other populations is highly likely.

Source: Published Research, Informal Publication, Professional Expertise

Q26: Impacts of Management on Native Species

Rating: High (range Low - High)

Confidence: Moderate (range Moderate - High)

Most available herbicides are too broad for effective use in wildlands, and broadcast spraying would have negative impacts on native species (Waggy, 2010). Use of willow stakes cut from nearby sources may have a net positive effect on native species, but more research is needed (Kim et al., 2006). Many treatment suggestions start with treatments that potentially eliminate all existing vegetation on a site (Lavergne & Molofsky, 2004; Kim et al., 2006). However, mechanical removal of *P. arundinacea* has been observed to have positive effects on some areas, for example, one assessor observed an area of *P. arundinacea* that was bulldozed had native salt marsh plants return on their own, suggesting that communities with long-lived native seedbanks may be able to return (R. Johnson, pers. comm. 2024).

Source: Published Research, Informal Publication, Professional Expertise

Q27: Inaccessibility of Invaded Areas

Rating: Moderate

Confidence: Moderate

Phalaris arundinacea occurs in both accessible and remote, inaccessible locations.

Source: Professional expertise

Q28: Sociopolitical Implications of Management

Rating: Moderate/Low (range Insignificant - High)

Confidence: High

Treatment efforts in populated areas may require additional public education.

Source: Informal Publication, Professional Expertise

Additional Comments

None

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