

Washington Invasive Ranking System

Washington Natural Heritage Program

Solidago altissima (Tall Goldenrod)

Assessed by

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Ecological Impact Rank: **Moderate** (66)

Confidence: **Low** (33)

Management Difficulty Rank: Low (40)

Confidence: Low (30)

Biological Characteristics of Invasiveness: High (78)

Confidence: High (71)

Concern Related to Distribution and Abundance: Moderate (52)

Confidence: High (50)



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Ranking Notes

Solidago altissima is native to the eastern and central portions of North America and as far west as Montana (Walck et al., 2001). Sometimes this species is included as part of the *Solidago canadensis* complex (Kato-Noguchi & Kato, 2022).

Legal Listings

[Washington State Weed Board](#): No

[Washington Invasive Species Council](#): No

Section 1: Distribution and Abundance

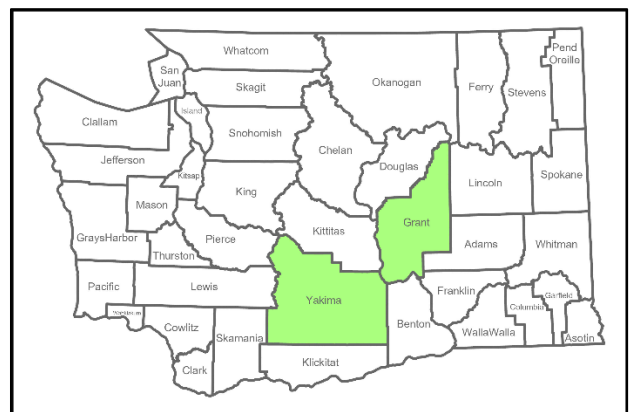


Figure 1. Distribution of counties where *Solidago altissima* has been documented in Washington State (CPNWH, 2023; EDDMapS, 2023; iNaturalist Contributors, 2023).

Q1: Current Range Size in Washington

Rating: Low

Confidence: High

Solidago altissima is found in 5% counties in Washington State (CPNWH, 2023; EDDMapS, 2023; iNaturalist Contributors, 2023).

Source: Herbarium records and other observations

Q2: Current Trend in Total Range

Rating: Moderate

Confidence: Moderate

Solidago altissima is currently only known from six confirmed locations on the Columbia Plateau in Washington. The first observation of this species is from 1948 and four of these observations are from the last 20 years. None of the recent observations appear to be from new watersheds (CPNWH, 2023; iNaturalist Contributors, 2023). Cold, dry climate may limit the spread of this species (Park et al., 2020).

Source: Published research, Herbarium records and other observations.

Q3: Proportion of Potential Range Currently Unoccupied

Rating: High

Confidence: Moderate

In its native range, *Solidago altissima* occurs in grasslands and open woodlands and in moist to dry habitats and is broadly adaptable. It occurs over a wide range of latitudes (25–45 degrees) (Etterson et al., 2008). This suggests *S. altissima* could potentially establish in open, disturbed habitats throughout most of Washington State, but to date it is mainly restricted to the fringes of herbaceous (often alkaline) wetlands.

Source: Published research, Professional expertise

Q4: Local Range Expansion or Change in Abundance

Rating: Unknown

Confidence: Not Rated

In the last 10 years, documented populations of *S. altissima* have grown from three to six. All of these records are currently from the Columbia Plateau (CPNWH, 2023; iNaturalist Contributors, 2023). The actual increase in cover (if any) of this species is unknown.

Source: Herbarium records and other observations

Q5: Diversity of Ecosystems Invaded

Ecosystem types: Emergent Open Wetland; Grassland & Shrubland

Rating: Low

Confidence: Moderate

In Washington, *Solidago altissima* is primarily documented from open riparian areas and wetland fringes (often alkaline) (T. Ramm-Granberg, pers. comm. 2025). This species is generally found in open habitats and in other parts of its range, it is also found in open habitats, including grasslands, open woodlands, old fields and pastures, and other open disturbed areas. It can also be found on roadsides and stream or riverbanks and can survive occasional flooding. While this species is found on forest edges, it is usually not found in forests in either its native or invasive range (Etterson et al., 2008; Park et al., 2020). This species occurs from moist to dry sites, and in its native range, it occurs from latitudes of 25–43 degrees (Etterson et al., 2008; Park et al., 2020). *Solidago altissima* is most successful on deep, nutrient rich soil and less competitive on shallow, rocky soils (Walck et al., 2001). The broad range of climate and geography that this species occurs on in its native range may increase adaptive ability and make *S. altissima* more successful outside of its native range. (Walck et al., 2001; Etterson et al., 2008; Park et al., 2020).

Source: Published research, Professional expertise

Section 2: Biological Characteristics

Q6: Aggressive Mode of Reproduction

Rating: Yes

Confidence: High

Solidago altissima reproduces sexually and vegetatively and can flower and reproduce by rhizomes in its first year. Local reproduction and population growth is usually clonal, but sources estimate that single plants produce 1000-200,000 seeds annually (Meyer & Schmid, 1999; Etterson et al., 2008; Kato-Noguchi & Kato, 2022), with one study estimating 30-75% germination (Kato-Noguchi & Kato, 2022). High germination rates in the lab do not necessarily indicate high germination in the field; at least one study found that most seeds failed to germinate in the field (frequently due to fungal infection or other disease) or vanished from field sites (Walck et al., 2001). Even with low germination rates in the field, high seed production makes this species an excellent colonizer. Aggressive colonization abilities combined with other competitive traits likely contribute to this species success as an invasive species in Europe and Asia (Meyer & Schmid, 1999; Etterson et al., 2008; Kato-Noguchi & Kato, 2022). However, in *S. altissima*'s native range, herbivory pressure can prevent sexual reproduction (Meyer & Schmid, 1999; Walck et al., 2001; Etterson et al., 2008).

Source: Published Research, Professional expertise

Q7: Innate Potential for Long-Distance Dispersal

Rating: Yes

Confidence: High

Seeds are small and lightweight and have a feathery pappus that aids in wind distribution. They may also be dispersed by water (Kato-Noguchi & Kato, 2022). One study found only a small number of seeds remained in the study area after seed dispersal, suggesting a higher rate of dispersal than expected for this species (Meyer & Schmid, 1999).

Source: Published research, Professional expertise

Q8: Potential to be Spread by Human Activities

Rating: Yes

Confidence: High

While in Washington *Solidago altissima* doesn't currently occur in places where mowing or vehicle access is common, this species seeds could easily be

spread by mowing and other equipment given the opportunity. Soil disturbance could also spread this species via rhizome fragments. In Europe and Asia, this species was introduced as an ornamental and for pollinators (Walck et al., 2001; Etterson et al., 2008).

Source: Published research, Professional expertise

Q9: Allelopathy

Rating: Yes

Confidence: Moderate

Allelopathy in *Solidago altissima* is relatively well-researched (Uesugi et al., 2019; Kato-Noguchi & Kato, 2022). This species produces several chemicals that are known to be allelopathic in closely related plant species, and allelopathy has been demonstrated in *S. altissima* in both the lab and the field (Uesugi et al., 2019). Common garden experiments suggest that *S. altissima* is allelopathic (at least against *Poa pratensis*) and that populations from this species' introduced range (Japan and Australia in this case) are more likely to be allelopathic than populations from the native range. Increase of allelopathic ability in introduced populations is likely related to herbivore release. Production of allelopathic chemicals also increased in *S. altissima* populations when herbivores were experimentally removed (Uesugi et al., 2019).

Source: Published research

Q10: Competitive for Limiting Abiotic Factors

Rating: Yes

Confidence: Moderate

Solidago altissima is considered strongly competitive, particularly in its invasive range (Uesugi et al., 2019; Kato-Noguchi & Kato, 2022) and is capable of displacing other species and resisting colonization (Walck et al., 2001). A study in Florida found that soil moisture was reduced in plant communities dominated by *S. altissima* in comparison to communities without *S. altissima* present (Kim, 2017), suggesting that this species is competitive for water. However, most sources attribute competitive success to light competition and allelopathy. The assessor has observed that dense stands of *Solidago altissima* reduce the size of co-



occurring *Solanum carolinense* (Carolina horsenettle) plants, though the etiolated growth of *S. carolinense* suggests this may be due to light competition.

Solidago altissima can also have reduced vigor when experiencing vegetative competition (Walck et al., 2001). Insect herbivory in this species' native range can reduce growth and change the outcome of competitive relationships in the vegetation community (Etterson et al., 2008). Competitive abilities in this species introduced range could be in part because of reduced herbivory pressure.

Solidago altissima senesces in late fall, even in southeastern North America. While this species may produce overwintering rosettes, this is not usual (Walck et al., 2001).

Source: Published research, Professional expertise

Q11: Growth Form

Rating: Yes

Confidence: High

Throughout most of its native and introduced range *Solidago altissima* grows in dense, monocultural stands, and outcompeting other species for light is likely how it gains dominance in a vegetation community. Height, leaf area, and ability for clonal growth make *S. altissima* an excellent competitor for light (Walck et al., 2001; Kato-Noguchi & Kato, 2022). Growth of other plants is limited underneath dense stands of *S. altissima*, and plants that are present are small and may exhibit signs of stress due to reduced light availability.

However, in Washington, this species currently usually occurs with species such as *Typha latifolia* and *Schoenoplectus acutus* which it may not be able to outcompete (T. Ramm-Granberg, pers. comm. 2024).

Source: Published research, Professional expertise

Q12: Germination Requirements

Rating: No

Confidence: Moderate

Solidago altissima germinates and survives best in bare ground. Seed germination is poor under litter and vegetation canopy, and likely requires light to initiate (Walck et al., 2001). Though lab germination tests report high seed viability rates, at least one study in Europe suggested germination in established vegetation is very rare (Meyer & Schmid, 1999). Mowing did not increase light availability at the soil level enough to encourage germination in this species (Meyer & Schmid, 1999). Germination, growth, and survival of *S. altissima* seedlings was much higher in bare ground (Meyer & Schmid, 1999).

Source: Published Research

Q13: Invasiveness of Other Plants in Genus

Rating: Yes

Confidence: High

Many *Solidago* species are of concern for their effects on plant communities throughout Asia and Europe. *Solidago altissima* and its close relative *Solidago canadensis* are considered either naturalized or invasive in Europe, Asia, Australia, and New Zealand (Park et al., 2020; Kato-Noguchi & Kato, 2022).

Source: Published research, Professional expertise

Q14: Shade Tolerance

Rating: Low/Insignificant

Confidence: Moderate

Solidago altissima is generally a species of open, sunny areas, and does not invade areas with closed canopies. Vegetative plants can tolerate shade, but are much less likely to flower or may not reproduce at all in shade (Walck et al., 2001; Park et al., 2020). Seeds of this species may also require light to germinate (Meyer & Schmid, 1999).

Source: Published research, Professional expertise

Q15: Disturbance Tolerance

Rating: Yes

Confidence: High

Solidago altissima likely requires disturbance to establish populations and disturbance is important to

maintaining the open habitats that this species prefers. However, *S. altissima* is generally a later colonizer in old field habitats, and yearly disturbances may limit this species' ability to persist (Collins et al., 2001; Walck et al., 2001). Frequent mowing, fire, and other disturbances can reduce food reserves stored in rhizomes, prevent reproduction and colonization of new sites, and reduce population size in this species (Meyer & Schmid, 1999; Collins et al., 2001; Walck et al., 2001).

Source: Published research, Professional expertise

Q16: Propagule Persistence

Rating: Unknown

Confidence: Not Rated

No quantitative data for propagule persistence in *Solidago altissima* was found in the literature search. Rhizomes can be maintained in refrigerated storage for at least a year. This species is described as forming a "large and long-lived" seedbank in its native range (Walck et al., 2001). One study from Europe found *S. altissima* to make between approximately 2–30% of the persistent seed bank where it was found (Meyer & Schmid, 1999). Seeds from this species are initially dormant and may require stratification to break dormancy and light to stimulate germination (Walck et al., 2001).

Source: Published research, Professional expertise

Q17: Palatability

Rating: No, plant is palatable

Confidence: Moderate

Though *Solidago altissima* is reported to decrease under grazing pressure, it is rarely eaten by mammals and may be toxic to mice (Walck et al., 2001). On the other hand, this species is host to a diversity of invertebrate herbivores in its native range, ranging from generalists like grasshoppers, to a wide variety of specialist gall-forming insects. Insect herbivory can reduce growth and other competitive advantages for this species, preventing it from developing a closed canopy that excludes other plants (Walck et al., 2001).

Source: Published research, Professional expertise

Section 3: Ecological Impact

Q18: Impact on Ecosystem Abiotic Processes

Abiotic Processes: Hydrology, Light availability

Rating: Low

Confidence: Moderate

Solidago altissima grows in dense stands that reduce light availability for neighboring plants. At least one study also found that *S. altissima* reduced soil water availability (Kim, 2017).

Source: Published research, Professional expertise

Q19: Impact on Ecosystem Structure

Rating: Low

Confidence: Moderate

In Washington, this plant primarily occurs in open riparian and wetland ecosystems dominated by other tall, rhizomatous herbs (e.g., *Typha latifolia*, *Schoenoplectus acutus*). Structural impacts are likely minor, aside from potential delayed establishment of native shrubs (T. Ramm-Granberg, pers. comm. 2025).

In other areas where this species has naturalized, *Solidago altissima* can grow five to six feet tall, and where this species is invasive it can create a tall layer of perennial vegetation over existing earlier-colonizing species (Collins et al., 2001).

Source: Published research, Professional expertise

Q20: Impact on Ecosystem Composition

Rating: Moderate

Confidence: Low

In Washington, *Solidago altissima* usually occurs with other highly competitive species, and in habitats that may naturally be low diversity (T. Ramm-Granberg, pers. comm. 2025).

However, in Europe and Asia, this species reduces plant community diversity where it occurs (Uesugi et



al., 2019). This species can also drive an increase in generalist pollinators and herbivores that may spill over to other species. Studies done in Florida, in *S. altissima*'s native range, have found that spillover from generalist herbivores can increase herbivory on neighboring plant species. Dense *S. altissima* stands can also hide neighboring species from their specialist pollinators or herbivores (Kim, 2017).

Source: Published research, Professional expertise

Q21: Impact on Particular Native Species

Rating: Unknown

Confidence: Not Rated

No information on *S. altissima* impacts to particular native species in Washington is available. However, this species is a model organism for testing associational effects on co-occurring plant species (e.g., Kim, 2017). These studies tend to focus on how *S. altissima* affects herbivory damage or pollination success in co-occurring plant species, and spillover effects have been demonstrated on *Solanum carolinense*, which overlaps *S. altissima*'s native range.

Solidago altissima likely has a reduced insect community outside of its native range (Etterson et al., 2008), so there may be less impact on abundance and behavior of insect herbivores and pollinators where it occurs in its invasive range.

Source: Published research, Professional expertise

Q22: Observed Ability to Invade Undisturbed Ecosystems

Rating: Low

Confidence: Moderate

This species does not persist under closed canopies and likely needs disturbance to establish (Meyer & Schmid, 1999; Park et al., 2020). All locations where it has been observed in Washington are anthropogenically disturbed.

Source: Published research, Professional expertise

Q23: Observed Ability to Invade Naturally Disturbed Ecosystems

Rating: Yes

Confidence: Moderate

Solidago altissima is known from disturbed areas in its native and non-native range (Park et al., 2020), including naturally disturbed areas like prairies and riverbanks. While the Washington sites where it has been documented all have varying degrees of anthropogenic disturbance, *S. altissima* is likely also able to invade naturally disturbed ecosystems that lack significant human impacts.

Source: Published research, Professional expertise

Section 4: Management Difficulty

Q24: General Management Difficulty

Rating: Moderate

Confidence: Low

Mowing at flowering time is considered an effective treatment against *Solidago altissima*, and reduces rhizome growth, size, and survival (Stoll et al., 1998). One study in Europe found mowing at flowering reduced also reduced seed abundance on the soil surface from 49,000 seeds per meter to 1800 seeds per meter. Mowing reduced seed production in mowed areas to zero, and all seeds in mowed plots were from neighboring unmowed populations. Mowing also did not open the canopy enough to allow *S. altissima* seeds to germinate. Mowing prevents seed production which may be key in preventing spread of new populations of *S. altissima* where it is invasive (Meyer & Schmid, 1999).

However, mowing may not be a practical treatment in riparian areas or wetland sites. Information on other management techniques for this species were not found.

Source: Published research

Q25: Minimum Time Commitment

Rating: Unknown

Confidence: Not Rated

No sources mentioned a minimum time commitment for treating *S. altissima* invasions. Given the presence of a seed bank and the abundant rhizomes this species produces, treatments need to persist for at least the amount of time it takes to exhaust propagules.

Source: Professional expertise

Q26: Impacts of Management on Native Species

Rating: Low

Confidence: Low

In mowing experiments from *Solidago altissima*'s native range, mowing increased species diversity (Collins et al., 2001), though this may not be beneficial for naturally low diversity ecosystems. This species occurs in naturally disturbed ecosystems, so management by mowing may not be as impactful to native species as other treatment options (e.g., herbicide or tilling).

Source: Published research, Professional expertise

Q27: Inaccessibility of Invaded Areas

Rating: Insignificant

Confidence: High

There are only six documented populations of *Solidago altissima* in Washington, and they are all near highways and populated areas (CPNWH, 2023; iNaturalist Contributors, 2023).

Source: Herbarium records and other observations

Q28: Sociopolitical Implications of Management

Rating: Insignificant

Confidence: Moderate

Solidago altissima is attractive to many pollinators and has been introduced in Asia in part because of its attractiveness to pollinators (Park et al., 2020). This may be the most likely friction point for management of this species.

Source: Published research, Professional expertise

Additional Comments

None

References

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