## WEED RISK ASSESSMENT FORM

| | |
|---|---|
| Botanical and common name: | *Polygonum persicaria* L. or *Persicaria maculosa* Gray, spotted ladysthumb, *Polygonum lapathifolium* L. or *Persicaria lapathifolia* (Linnaeus) Gray, curlytop knotweed |


| | | |
|---|---|---|
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**Outcome score:**

| **A.** | **Climatic Comparison** | | |
|---|---|---|---|
| | This species is present or may potentially establish in the following eco-geographic regions: | | |
| 1 | South Coastal | Yes | |
| 2 | Interior-Boreal | Yes | |
| 3 | Arctic-Alpine | Yes | |

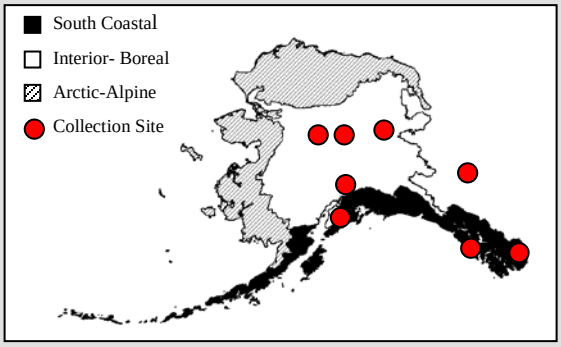
| **B.** | **Invasiveness Ranking** | Total (Total Answered*) Possible | Total |
|---|---|---|---|
| 1 | Ecological impact | 40 (40) | 6 |
| 2 | Biological characteristic and dispersal ability | 25 (25) | 16 |
| 3 | Ecological amplitude and distribution | 25 (19) | 15 |
| 4 | Feasibility of control | 10 (10) | 7 |
| | Outcome score | 100 (94)[b] | 44 [a] |
| | Relative maximum score† | | 0.47 |

* For questions answered "unknown" do not include point value for the question in parentheses for "Total Answered Points Possible."
† Calculated as [a]/[b].

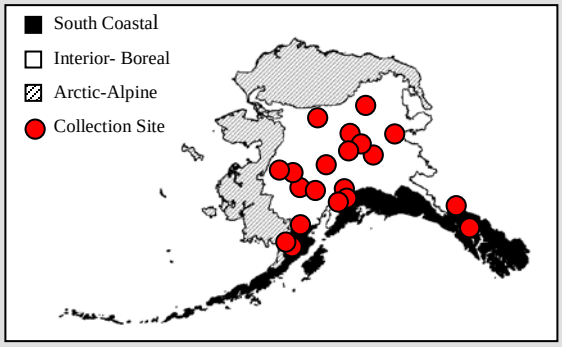
### A. CLIMATIC COMPARISON:

| | |
|---|---|
| | 1.1. Has this species ever been collected or documented in Alaska? |
| Yes | Yes – continue to 1.2 |
| | No – continue to 2.1 |
| | 1.2. Which eco-geographic region has it been collected or documented (see inset map)? *Proceed to Section B. Invasiveness Ranking*. |
| Yes | South Coastal |
| Yes | Interior-Boreal |
| No | Arctic-Alpine |

Documentation: *Polygonum persicaria* has been documented in South Coastal and Interior-Boreal ecogeographic regions of Alaska (Weeds of Alaska Database 2005, Hultén 1968, UAM 2004).




Documentation: *Polygonum lapathifolium* has been documented in South Coastal, Interior-Boreal and Arctic-Alpine ecogeographic regions of Alaska (Weeds of Alaska Database 2005, Hultén 1968, UAM 2004).




Sources of information:

Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 p.

University of Alaska Museum. University of Alaska Fairbanks. 2004. http://hispida.museum.uaf.edu:8080/home.cfm

Weeds of Alaska Database. 2005. Database of exotic vegetation collected in Alaska. University of Alaska, Alaska Natural Heritage Program – US Forest Service – National Park Service Database. Available: http://akweeds.uaa.alaska.edu/

2.1. Is there a 40% or higher similarity (based on CLIMEX climate matching) between climates any where the species currently occurs and

a. Juneau (South Coastal Region)?

Yes – *record locations and similarity; proceed to Section B. Invasiveness Ranking*

No

b. Fairbanks (Interior-Boreal)?

Yes – *record locations and similarity; proceed to Section B. Invasiveness Ranking*

No

c. Nome (Arctic-Alpine)?

Yes

Yes – *record locations and similarity; proceed to Section B. Invasiveness Ranking*

No

*– If "No" is answered for all regions, reject species from consideration*

Documentation: *Polygonum persicaria* and *P. lapathifolia* are known to occur as far north in Europe as the northern province in Norway (Finnmark) at 70ºN (Lid and Lid 1994). This region is recognized as having arctic tundra vegetation (CAFF Circumpolar Arctic Vegetation Map), Using the CLIMEX matching program, the climatic similarity between Nome and areas where the species is documented is fairly high. The range of the species includes Røros and Dombås, Norway, which have a 76% and 63% of climatic match with Nome respectively. It is therefore possible for these two species to establish in the Arctic-Alpine ecoregion of Alaska.

Sources of information:

Conservation of Arctic Flora and Fauna. Circumpolar Arctic Vegetation Map. Borgir – Nordurslod – Akureyri – Iceland; Available from: http://www.caff.is/

CLIMEX for Windows, Version 1.1a. 1999. CISRO Publishing, Australia.

Lid, J. and D.T. Lid. 1994. Flora of Norway. The Norske Samlaget, Oslo. Pp. 1014.

**B. INVASIVENESS RANKING**

*1. ECOLOGICAL IMPACT*

1.1. Impact on Natural Ecosystem Processes

| | | |
|---|---|---|
| A. | No perceivable impact on ecosystem processes | 0 |
| B. | Influences ecosystem processes to a minor degree (e.g., has a perceivable but mild influence on soil nutrient availability) | 3 |
| C. | Significant alteration of ecosystem processes (e.g., increases sedimentation rates along streams or coastlines, reduces open water that are important to waterfowl) | 7 |
| D. | Major, possibly irreversible, alteration or disruption of ecosystem processes (e.g., the species alters geomorphology; hydrology; or affects fire frequency, altering community composition; species fixes substantial levels of nitrogen in the soil making soil unlikely to support certain native plants or more likely to favor non-native species) | 10 |
| U. | Unknown | |

Score 0

Documentation:

Identify ecosystem processes impacted:

Spotted ladysthumb and curlytop knotweed reduce soil water and nutrient availability (Royer and Dickinson 1999). Stands of plants of these species may prevent the water flow in canals and irrigated ditches (DiTomaso and Healy 2003). However, impact on natural ecosystem processes has not been documented.

Rational:

Sources of information:

Royer, F. and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.

DiTomaso, J.M. and E.A. Healy. 2003. Aquatic and riparian weeds of the West. California: University of California, Agriculture and Natural Resources; pp. 314-328.

1.2. Impact on Natural Community Structure

| | | |
|---|---|---|
| A. | No perceived impact; establishes in an existing layer without influencing its structure | 0 |
| B. | Influences structure in one layer (e.g., changes the density of one layer) | 3 |
| C. | Significant impact in at least one layer (e.g., creation of a new layer or elimination of an existing layer) | 7 |
| D. | Major alteration of structure (e.g., covers canopy, eradicating most or all layers below) | 10 |
| U. | Unknown | |

Score 0

Documentation:

Identify type of impact or alteration:

Spotted ladysthumb and curlytop knotweed are able to colonize disturbed ground and change the density of the layer (I. Lapina – pers. obs.). No impact on the natural community structure has been documented.

Rational:

Sources of information:

Lapina, I., Botanist, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska. Tel: (907) 257-2710 – Pers. obs.

1.3. Impact on Natural Community Composition

| | | |
|---|---|---|
| A. | No perceived impact; causes no apparent change in native populations | 0 |
| B. | Influences community composition (e.g., reduces the number of individuals in one or more native species in the community) | 3 |
| C. | Significantly alters community composition (e.g., produces a significant reduction in the population size of one or more native species in the community) | 7 |
| D. | Causes major alteration in community composition (e.g., results in the extirpation of one or several native species, reducing biodiversity or change the community composition towards species exotic to the natural community) | 10 |

U. Unknown

Score 1

Documentation:
Identify type of impact or alteration:
Spotted ladysthumb and curlytop knotweed have not been observed in native communities in Alaska (Welsh 1974, I. Lapina – pers. obs.). It is unlikely that measurable impacts on native community composition occur due to its presence.
Rational:

Sources of information:
Lapina, I. Botanist, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska. Tel: (907) 257-2710 – Pers. obs.
Welsh, S.L. 1974. Anderson's flora of Alaska and adjacent parts of Canada. Brigham University Press. 724 pp.

1.4. Impact on higher trophic levels (cumulative impact of this species on the animals, fungi, microbes, and other organisms in the community it invades)

| | | |
|---|---|---|
| A. | Negligible perceived impact | 0 |
| B. | Minor alteration | 3 |
| C. | Moderate alteration (minor reduction in nesting/foraging sites, reduction in habitat connectivity, interference with native pollinators, injurious components such as spines, toxins) | 7 |
| D. | Severe alteration of higher trophic populations (extirpation or endangerment of an existing native species/population, or significant reduction in nesting or foraging sites) | 10 |
| U. | Unknown | |

Score 5

Documentation:
Identify type of impact or alteration:
Both spotted ladysthumb and curlytop knotweed provide important cover and food source for many species of birds and mammals (DiTomaso and Healy 2003, Wilson et al. 1999). Flowers are frequently visited by insects (Simmons 1945a). These weeds are also a host for number of fungi, viruses, and nematode species (Edwards and Taylor 1963, Townshend and Davidson 1962). Hybrids of *Polygonum persicaria* with *P. lapathifolium*, and *P. hidropiper* have been recorded (Simmons 1945a, b).
Rational:

Sources of information:
DiTomaso, J.M. and E.A. Healy. 2003. Aquatic and riparian weeds of the West. California: University of California, Agriculture and Natural Resources; pp. 314-328.
Edwards, D.I. and D.P. Taylor. 1963. Host range of an Illinois population of the stem nematode (*Ditylenchus dipsaci*) isolated from onion. Nematologica 9: 305-312.
Simmonds, N.W. 1945a. *Polygonum persicaria* L. The Journal of Ecology 33(1): 121-131.
Simmonds, N.W. 1945b. *Polygonum lapathifolium* L. The Journal of Ecology 33(1): 132-139.
Townshend, J.L. and T.R. Davidson. 1962. Some weed hosts of the northern root-knot nematode, *Meloidogyne hapla* Chitwood, 1949, in Ontario. Canadian Journal of Botany 40: 543-548.
Wilson, J.D., A.J. Morris, B.E. Arroyo, S.C. Clark and R.B. Bradbury. 1999. A review of the abundance and diversity of invertebrate and plant foods of granivorous birds in northern Europe in relation to agricultural change. Agriculture, Ecosystems, and Environment 75: 13-30.

Total Possible 40
Total 6

*2. BIOLOGICAL CHARACTERISTICS AND DISPERSAL ABILITY*

2.1. Mode of reproduction

| | | |
|---|---|---|
| A. | Not aggressive reproduction (few [0-10] seeds per plant and no vegetative reproduction) | 0 |
| B. | Somewhat aggressive (reproduces only by seeds (11-1,000/$m^2$) | 1 |
| C. | Moderately aggressive (reproduces vegetatively and/or by a moderate amount of seed, <1,000/$m^2$) | 2 |
| D. | Highly aggressive reproduction (extensive vegetative spread and/or many seeded, >1,000/$m^2$) | 3 |
| U. | Unknown | |

Score 3

Documentation:

Describe key reproductive characteristics (including seeds per plant):

Spotted ladysthumb plant can produce up to 1,550 seeds per season (Mertens and Jansen 2002, Stevens 1932). Curlytop knotweed is capable of producing up to 19,300 seeds per season (Stevens 1932). Askew and Wilcut (2002) estimated achene production of curlytop knotweed as 63,000 to 25,000 per $m^2$.

Rational:

Sources of information:

Askew, S.D. and J.W. Wilcut. 2002. Pale smartweed interference and achene production in cotton. Weed Science 50: 357-363.

Mertens, S.K. and J. Hansen. 2002. Weed seed production, crop planting pattern, and mechanical weeding in wheat. Weed Science 50: 748-756.

Stevens, O.A. 1932. The number and weight of seeds produced by weeds. American Journal of Botany 19(9): 784-794.

2.2. Innate potential for long-distance dispersal (bird dispersal, sticks to animal hair, buoyant fruits, wind-dispersal)

| | | |
|---|---|---|
| A. | Does not occur (no long-distance dispersal mechanisms) | 0 |
| B. | Infrequent or inefficient long-distance dispersal (occurs occasionally despite lack of adaptations) | 2 |
| C. | Numerous opportunities for long-distance dispersal (species has adaptations such as pappus, hooked fruit-coats, etc.) | 3 |
| U. | Unknown | |

Score 3

Documentation:

Identify dispersal mechanisms:

Achenes can be dispersed by birds and animals after ingestion. Seeds also can be carried in mud on the feet of birds and animals. The seeds can float for one day and thus can be dispersed by irrigation water, rain streams, and water courses (Simmonds 1945a, b).

Rational:

Sources of information:

Simmonds, N.W. 1945a. *Polygonum persicaria* L. The Journal of Ecology 33(1): 121-131.

Simmonds, N.W. 1945b. *Polygonum lapathifolium* L. The Journal of Ecology 33(1): 132-139.

2.3. Potential to be spread by human activities (both directly and indirectly – possible mechanisms include: commercial sales, use as forage/revegetation, spread along highways, transport on boats, contamination, etc.)

| | | |
|---|---|---|
| A. | Does not occur | 0 |
| B. | Low (human dispersal is infrequent or inefficient) | 1 |
| C. | Moderate (human dispersal occurs) | 2 |
| D. | High (there are numerous opportunities for dispersal to new areas) | 3 |
| U. | Unknown | |

Score 3

Documentation:
Identify dispersal mechanisms:
Seeds of spotted ladysthumb and curlytop knotweed can be eaten and passed through the digestive tracts of domestic animals and birds. Wet seeds can stick to clothes, domestic animal fur, or to agricultural equipment (DiTomaso ans Healy 2003, Simmonds 1945a, b). Seeds of these species also can contaminate commercial seeds (Dorph-Petersen 1925) and soil (Hodkinson and Thompson 1997).
Rational:

Sources of information:
DiTomaso, J.M. and E.A. Healy. 2003. Aquatic and riparian weeds of the West. California: University of California, Agriculture and Natural Resources; pp. 314-328.
Dorph-Petersen, K. 1925. Examination of the occurrence and vitality of various weed seed species under different conditions, made at the Danish State Seed Testing Station during the years 1896-1923. 4th International Seed Testing Congress, 1924, Cambridge, England. pp. 128-138.
Hodkinson, D. and K. Thompson. 1997. Plant dispersal: the role of man. Journal of Applied Ecology, 34: 1484-1496.
Simmonds, N.W. 1945a. *Polygonum persicaria* L. The Journal of Ecology 33(1): 121-131.
Simmonds, N.W. 1945b. *Polygonum lapathifolium* L. The Journal of Ecology 33(1): 132-139.

## 2.4. Allelopathic

| | | |
|---|---|---|
| A. | No | 0 |
| B. | Yes | 2 |
| U. | Unknown | |

Score 0

Documentation:
Describe effect on adjacent plants:
Spotted ladysthumb has no allelopathy potential (USDA, NRCS 2006). Curlytop knotweed is closely related to spotted ladysthumb and very likely it is also not allelopathic.
Rational:

Sources of information:
USDA, NRCS. 2006. *The PLANTS Database*, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

## 2.5. Competitive ability

| | | |
|---|---|---|
| A. | Poor competitor for limiting factors | 0 |
| B. | Moderately competitive for limiting factors | 1 |
| C. | Highly competitive for limiting factors and/or nitrogen fixing ability | 3 |
| U. | Unknown | |

Score 1

Documentation:
Evidence of competitive ability:
Although spotted ladysthumb and curlytop knotweed are extremely tolerant of a wide range of environmental conditions, they appear to require reduction of competition for successful growth and persistence (Simmonds 1945b).
Rational:
Curlytop knotweed was a weak competitor with crops in experiments of O'Donovan (1994) and Askew and Wilcut (2002).
Sources of information:
Askew, S.D. and J.W. Wilcut. 2002. Pale smartweed interference and achene production in cotton. Weed Science 50: 357-363.
Simmonds, N.W. 1945b. *Polygonum lapathifolium* L. The Journal of Ecology 33(1): 132-139.

O'Donovan, J.T. 1994. Green foxtail (*Setaria viridis*) and pale smartweed (*Polygonum lapathifolium*) interference in field crops. Weed Technology 8: 311-316.

2.6. Forms dense thickets, climbing or smothering growth habit, or otherwise taller than the surrounding vegetation

| | | |
|---|---|---|
| A. | No | 0 |
| B. | Forms dense thickets | 1 |
| C. | Has climbing or smothering growth habit, or otherwise taller than the surrounding vegetation | 2 |
| U. | Unknown | |

Score 0

Documentation:
Describe grow form:
Spotted ladysthumb and curlytop knotweed do not form dense thickets in Alaska. Both species do not have climbing or smothering growth habit (DiTomaso and Healy 2003).
Rational:

Sources of information:
DiTomaso, J.M. and E.A. Healy. 2003. Aquatic and riparian weeds of the West. California: University of California, Agriculture and Natural Resources; pp. 314-328.

2.7. Germination requirements

| | | |
|---|---|---|
| A. | Requires open soil and disturbance to germinate | 0 |
| B. | Can germinate in vegetated areas but in a narrow range or in special conditions | 2 |
| C. | Can germinate in existing vegetation in a wide range of conditions | 3 |
| U. | Unknown | |

Score 0

Documentation:
Describe germination requirements:
Since spotted ladysthumb and curlytop knotweed are always found in disturbed communities (Simmonds 1945a, b, Staniforth and Cavers 1979), disturbed soil can be important requirement for germination of seeds.
Rational:

Sources of information:
Simmonds, N.W. 1945a. *Polygonum persicaria* L. The Journal of Ecology 33(1): 121-131.
Simmonds, N.W. 1945b. *Polygonum lapathifolium* L. The Journal of Ecology 33(1): 132-139.
Staniforth, R.J. and P.B. Cavers. 1997. Distribution and habitats of four annual smartweeds in Ontario. Canadian Field-Naturalist 93(4): 378-385.

2.8. Other species in the genus invasive in Alaska or elsewhere

| | | |
|---|---|---|
| A. | No | 0 |
| B. | Yes | 3 |
| U. | Unknown | |

Score 3

Documentation:
Species:
*Polygonum cuspidatum* Sieb. & Zucc., *P. perfoliatum* L., *P. polystachyum* Wallich ex Meisn., *P. sachalinense* F. Schmidt ex Maxim. are declared noxious in a number of American states. Also *Polygonum arenastrum* Jord. ex Boreau, *P. caespitosum* Blume, *P. convolvulus* L., *P. orientale* L., and *P. aviculare* L. are listed as weeds in the PLANTS Database (USDA, NRSC 2006). A number of *Polygonum* species native to North America *Polygonum* species have a weedy habit and are listed as noxious weeds in some of the American states. Although the latest taxonomy considers these species as members of three different genus: *Polygonum*, *Fallopia* and *Persicaria* (FNA 1993+), they are closely related taxa and can be considered as congeneric weeds.

Sources of information:
USDA, NRCS. 2006. *The PLANTS Database*, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 7+ vols. New York and Oxford.

2.9. Aquatic, wetland, or riparian species

| | | |
|---|---|---|
| A. | Not invasive in wetland communities | 0 |
| B. | Invasive in riparian communities | 1 |
| C. | Invasive in wetland communities | 3 |
| U. | Unknown | |

Score 3

Documentation:
Describe type of habitat:
Although spotted ladysthumb and curlytop knotweed are typically plants of fields, roadsides, gardens, and waste grounds, they often occur together on riverbanks, edges of ponds, lakes, streams, and marshes (DiTomaso and Healy 2003, Staniforth and Cavers 1979).
Rational:

Sources of information:
DiTomaso, J.M. and E.A. Healy. 2003. Aquatic and riparian weeds of the West. California: University of California, Agriculture and Natural Resources; pp. 314-328.
Staniforth, R.J. and P.B. Cavers. 1997. Distribution and habitats of four annual smartweeds in Ontario. Canadian Field-Naturalist 93(4): 378-385.

Total Possible 25
Total 16

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*3. DISTRIBUTION*

3.1. Is the species highly domesticated or a weed of agriculture

| | | |
|---|---|---|
| A. | No | 0 |
| B. | Is occasionally an agricultural pest | 2 |
| C. | Has been grown deliberately, bred, or is known as a significant agricultural pest | 4 |
| U. | Unknown | |

Score 4

Documentation:
Identify reason for selection, or evidence of weedy history:
Both, spotted ladysthumb and curlytop knotweed have long been associated with agricultural activities (Staniforth and Cavers 1979).
Rational:

Sources of information:
Staniforth, R.J. and P.B. Cavers. 1997. Distribution and habitats of four annual smartweeds in Ontario. Canadian Field-Naturalist 93(4): 378-385.

3.2. Known level of ecological impact in natural areas

| | | |
|---|---|---|
| A. | Not known to cause impact in any other natural area | 0 |
| B. | Known to cause impacts in natural areas, but in dissimilar habitats and climate zones than exist in regions of Alaska | 1 |
| C. | Known to cause low impact in natural areas in similar habitats and climate zones to those present in Alaska | 3 |
| D. | Known to cause moderate impact in natural areas in similar habitat and climate zones | 4 |
| E. | Known to cause high impact in natural areas in similar habitat and climate zones | 6 |
| U. | Unknown | |

Score U

Documentation:
Identify type of habitat and states or provinces where it occurs:
Spotted ladysthumb and curlytop knotweed are commonly found on naturally disturbed sites, such as riverbanks, lakeshores or exposed mud (DiTomaso and Healy 2003, Staniforth and Cavers 1979). However, ecological impact in natural communities is poorly documented.
Sources of information:
DiTomaso, J.M. and E.A. Healy. 2003. Aquatic and riparian weeds of the West. California: University of California, Agriculture and Natural Resources; pp. 314-328.
Staniforth, R.J. and P.B. Cavers. 1997. Distribution and habitats of four annual smartweeds in Ontario. Canadian Field-Naturalist 93(4): 378-385.

### 3.3. Role of anthropogenic and natural disturbance in establishment

| | | |
|---|---|---|
| A. | Requires anthropogenic disturbances to establish | 0 |
| B. | May occasionally establish in undisturbed areas but can readily establish in areas with natural disturbances | 3 |
| C. | Can establish independent of any known natural or anthropogenic disturbances | 5 |
| U. | Unknown | |

Score 3

Documentation:
Identify type of disturbance:
Spotted ladysthumb and curlytop knotweed establish in disturbed communities only (Simmonds 1945a, b). In Ontario curlytop knotweed is commonly found in naturally disturbed sites such as riverbanks, sandy beaches, exposed mud (Staniforth and Cavers 1979).
Rational:

Sources of information:
Simmonds, N.W. 1945a. *Polygonum persicaria* L. The Journal of Ecology 33(1): 121-131.
Simmonds, N.W. 1945b. *Polygonum lapathifolium* L. The Journal of Ecology 33(1): 132-139.
Staniforth, R.J. and P.B. Cavers. 1997. Distribution and habitats of four annual smartweeds in Ontario. Canadian Field-Naturalist 93(4): 378-385.

### 3.4. Current global distribution

| | | |
|---|---|---|
| A. | Occurs in one or two continents or regions (e.g., Mediterranean region) | 0 |
| B. | Extends over three or more continents | 3 |
| C. | Extends over three or more continents, including successful introductions in arctic or subarctic regions | 5 |
| U. | Unknown | |

Score 3

Documentation:
Describe distribution:
Spotted ladysthumb and curlytop knotweed are distributed throughout Europe to 70°N in Norway (Lid and Lid 1994) and Russia, in Asia, North Africa, North and South America, Australia and New Zealand (Hultén 1968).
Rational:

Sources of information:
Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 p.
Lid, J. and D. T. Lid. 1994. Flora of Norway. The Norske Samlaget, Oslo. Pp. 1014.

### 3.5. Extent of the species U.S. range and/or occurrence of formal state or provincial listing

| | | |
|---|---|---|
| A. | 0-5% of the states | 0 |
| B. | 6-20% of the states | 2 |
| C. | 21-50%, and/or state listed as a problem weed (e.g., “Noxious,” or “Invasive”) in 1 | 4 |

state or Canadian province

D. Greater than 50%, and/or identified as “Noxious” in 2 or more states or Canadian provinces — 5

U. Unknown

Score: 5

Documentation:

Identify states invaded:

Spotted ladysthumb and curlytop knotweed are found throughout the United States and Canada (Royer and Dickinson 1999, USDA, NRCS 2006). *Polygonum lapathifolium* declared a weed in Manitoba and Quebec (Royer and Dickinson 1999).

Rational:

Sources of information:

Royer, F. and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.

USDA, NRCS. 2006. *The PLANTS Database*, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

Total Possible: 19

Total: 15

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## *4. FEASIBILITY OF CONTROL*

### 4.1. Seed banks

A. Seeds remain viable in the soil for less than 3 years — 0

B. Seeds remain viable in the soil for between 3 and 5 years — 2

C. Seeds remain viable in the soil for 5 years and more — 3

U. Unknown

Score: 3

Documentation:

Identify longevity of seed bank:

Dorph-Petersen (1925) found that seeds of spotted ladysthumb and curlytop knotweed remained viable for up to 5-7 years. Toole (1946) reported 30 years of viability for spotted ladysthumb seeds buried in the soil. Chippindale and Milton (1934) found seeds remaining viable in different fields for six, eight, 22, and 68 years.

Rational:

Sources of information:

Chippindale, H.G. and W.E.J. Milton. 1934. On the viable seeds present in the soil beneath pasture. The Journal of Ecology 22(2): 508-531.

Dorph-Petersen, K. 1925. Examination of the occurrence and vitality of various weed seed species under different conditions, made at the Danish State Seed Testing Station during the years 1896-1923. 4th International Seed Testing Congress, 1924, Cambridge, England. pp. 128-138.

Toole, E.H. 1946. Final results of the Duvel buried seed experiment. Journal of Agricultural Research 72(6): 201-210.

### 4.2. Vegetative regeneration

A. No resprouting following removal of aboveground growth — 0

B. Resprouting from ground-level meristems — 1

C. Resprouting from extensive underground system — 2

D. Any plant part is a viable propagule — 3

U. Unknown

Score: 2

Documentation:

Describe vegetative response:

Vegetative regeneration has not been recorded for both species. However, Simmonds (1945a) reported its ability to persist into a second year after cutting.

Rational:

Sources of information:
Simmonds, N.W. 1945a. *Polygonum persicaria* L. The Journal of Ecology 33(1): 121-131.

4.3. Level of effort required

| | | |
|---|---|---|
| A. | Management is not required (e.g., species does not persist without repeated anthropogenic disturbance) | 0 |
| B. | Management is relatively easy and inexpensive; requires a minor investment in human and financial resources | 2 |
| C. | Management requires a major short-term investment of human and financial resources, or a moderate long-term investment | 3 |
| D. | Management requires a major, long-term investment of human and financial resources | 4 |
| U. | Unknown | |

Score 2

Documentation:
Identify types of control methods and time-term required:
Mechanical methods (hand-pulling, mowing) can control populations. Improving the drainage will discourage these weeds from reestablishment (DiTomaso and Healy 2003).
Rational:

Sources of information:
DiTomaso, J.M. and E.A. Healy. 2003. Aquatic and riparian weeds of the West. California: University of California, Agriculture and Natural Resources; pp. 314-328.

| | |
|---|---|
| Total Possible | 10 |
| Total | 7 |
| **Total for 4 sections Possible** | 94 |
| **Total for 4 sections** | 44 |

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