**WEED RISK ASSESSMENT FORM**

**Botanical and common name:** *Polygonum sachalinense* F. Schmidt ex Maxim. (*Fallopia sachalinensis* (F. Schmidt ex Maxim.) Dcne., giant knotweed

*Polygonum bohemicum* (J. Chrtek & Chrtková) J. P. Bailey, Bohemian knotweed


**Assessors:**

Irina Lapina
Botanist, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska 99501
tel: (907) 257-2710; fax (907) 257-2789

Matthew L. Carlson, Ph.D.
Assistant Professor, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska 99501
tel: (907) 257-2790; fax (907) 257-2789

**Reviewers:**

Michael Shephard
Vegetation Ecologist Forest Health Protection State & Private Forestry, 3301 C Street, Suite 202, Anchorage, AK 99503
(907) 743-9454; fax 907 743-9479

Jeff Conn, Ph.D.
Weed Scientist, USDA Agricultural Research Service PO Box 757200 Fairbanks, Alaska 99775 tel: (907) 474-7652; fax (907) 474-6184

Julie Riley
Horticulture Agent, UAF Cooperative Extension Service
2221 E. Northern Lights Blvd. #118 Anchorage, AK 99508-4143
tel: (907) 786-6306

Jeff Heys
Exotic Plant Management Program Coordinator, National Park Service, Alaska Region - Biological Resources Team, 240 W. 5th Ave, #114, Anchorage, AK 99501
tel: (907)644-3451, fax: 644-3809

Page Spencer, Ph.D.
Ecologist, National Park Service, Alaska Region - Biological Resources Team, 240 W. 5th Ave, #114, Anchorage, AK 99501
tel: (907) 644-3448

**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 No

This species is unlikely to establish in any region in Alaska

**B. Invasiveness Ranking**

<table>
<thead>
<tr>
<th>Invasiveness</th>
<th>Total (Total Answered*) Possible</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ecological impact</td>
<td>40 (40)</td>
<td>33</td>
</tr>
<tr>
<td>2 Biological characteristic and dispersal ability</td>
<td>25 (25)</td>
<td>21</td>
</tr>
<tr>
<td>3 Ecological amplitude and distribution</td>
<td>25 (25)</td>
<td>23</td>
</tr>
<tr>
<td>4 Feasibility of control</td>
<td>10 (7)</td>
<td>7</td>
</tr>
</tbody>
</table>

Outcome score 100 (97)*

Relative maximum score† 0.87

* 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 – 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: Japanese knotweed has been collected from Sitka, Anchorage, Juneau, Port Alexander (Densmore et al. 2001, UAM 2003).

Sources of information:
http://hispida.museum.uaf.edu:8080/home.cfm

2.1. Is there a 40% or higher similarity (based on CLIMEX climate matching) between climates anywhere 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 – record locations and similarity; proceed to Section B.
Invasiveness Ranking

No

No

– If “No” is answered for all regions, reject species from consideration

Documentation: Using CLIMEX matching program, climatic similarity between Nome and areas where the species is documented is modest. It does occur in gardens within Anchorage (UAM 2003), which has 61% climatic match with Nome. However, this species ranges only as far north as Nova Scotia and Newfoundland in Canada and is restricted to regions of high precipitation in the UK (Seiger 1991). In northern Europe it is restricted to areas with greater than 120 frost-free days (Beerling et al. 1994). Nome has 80 frost-free days. This information suggests that establishment in the Arctic-Alpine eco-region of Alaska is unlikely and establishment in the Interior-Boreal region may only be possible under garden conditions.

Sources of information:
http://hispida.museum.uaf.edu:8080/home.cfm

B. INVASIVENESS RANKING

1. ECOLOGICAL IMPACT

A. No perceivable impact on ecosystem processes 0

B. Influences ecosystem processes to a minor degree (e.g., has a perceivable but mild 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 7

Documentation:
Identify ecosystem processes impacted:
Japanese knotweed increases risk of soil erosion following removal of stands. The dead stems and leaf litter decompose very slowly and form a deep organic layer which prevents native seeds from germinating, altering the natural succession of native plant species (Japanese Knotweed Alliance 2004, Seiger 1991). During dormancy, dried stalks can create a fire hazard (Ahrens 1975).

Rational:

Sources of information:

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 10

Documentation:
Identify type of impact or alteration:

Rational:

Sources of information:

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)

U. Unknown

**Documentation:**

**Identify type of impact or alteration:**

Japanese knotweed prevents native seeds from germinating, and hinders the natural succession of native herbs, shrubs, and trees (Seiger 1991, Beerling et al. 1994).

**Rational:**

**Sources of information:**


---

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)

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

**Documentation:**

**Identify type of impact or alteration:**

Japanese knotweed clogs waterways and lowers the quality of habitat for wildlife and fish. It reduces the food supply for juvenile salmon in the spring (Seiger 1991). It reduces the diversity of phytophagous insects (Beerling & Dawah 1993). Hybridizes with the introduced *Polygonum sachalinense*.

**Rational:**

**Sources of information:**


---

### 2. BIOLOGICAL CHARACTERISTICS AND DISPERAL ABILITY

#### 2.1. Mode of reproduction

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Not aggressive reproduction (few [0-10] seeds per plant and no vegetative reproduction)</td>
<td>0</td>
</tr>
<tr>
<td>B.</td>
<td>Somewhat aggressive (reproduces only by seeds (11-1,000/m²)</td>
<td>1</td>
</tr>
</tbody>
</table>

---
C. Moderately aggressive (reproduces vegetatively and/or by a moderate amount of seed, <1,000/m²) 2
D. Highly aggressive reproduction (extensive vegetative spread and/or many seeded, >1,000/m²) 3
U. Unknown

Documentation:
Describe key reproductive characteristics (including seeds per plant):
Reproduction is primarily vegetative (rhizomes and stem tissue – Japanese Knotweed Alliance 2004). Plants can produce abundant seed. But a large proportion is non-viable when fertile male plants are rare or absent (Conolly 1977). Densmore et al. (2001) observed, however, that the P. cuspidatum in Sitka National Historical Park appears to have established from seed.
Rational:
Sources of information:

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

Documentation:
Identify dispersal mechanisms:
The fragments of plants are easily washed downstream where they can resprout. There are also documented occurrences of spread across sea-water (Beerling et al. 1994). Fruits maintain a winged perianth and have an abscission zone on the pedicle suggesting adaptation for wind dispersal (Beerling et al. 1994).
Rational:
Sources of information:

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)  
C. Moderate (human dispersal occurs)  
D. High (there are numerous opportunities for dispersal to new areas)  
U. Unknown  

Score 3

Documentation:
Identify dispersal mechanisms:
Japanese knotweed has been planted as an ornamental in Southeast Alaska and in Anchorage and escapees from gardens. Transportation of soil containing rhizome fragments is possible (Seiger 1991, Densmore et al. 2001).
Rational:
Sources of information:

2.4. Allelopathic
A. No  
B. Yes  
U. Unknown  

Score 0

Documentation:
Describe effect on adjacent plants:
Unknown
Rational:
No records of allelopathy. Biochemical studies indicate it possesses antibacterial and antifungal properties, but no mention of allelopathic effects (Beerling et al. 1994)
Sources of information:

2.5. Competitive ability
A. Poor competitor for limiting factors  
B. Moderately competitive for limiting factors  
C. Highly competitive for limiting factors and/or nitrogen fixing ability  
U. Unknown  

Score 3

Documentation:
Evidence of competitive ability:
Rational:
Sources of information:

2.6. Forms dense thickets, climbing or smothering growth habit, or otherwise taller than the surrounding vegetation
<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>B.</td>
<td>Forms dense thickets</td>
<td>1</td>
</tr>
<tr>
<td>C.</td>
<td>Has climbing or smothering growth habit, or otherwise taller than the surrounding vegetation</td>
<td>2</td>
</tr>
<tr>
<td>U.</td>
<td>Unknown</td>
<td></td>
</tr>
</tbody>
</table>

**Documentation:**
Describe grow form: Forms very dense thickets that are generally taller (4 to 9 feet) than the surrounding herbaceous and shrubby vegetation (Densmore et al. 2001, Seiger 1991, Whitson et al. 2000).

**Rational:**

**Sources of information:**

---

2.7. Germination requirements

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Requires open soil and disturbance to germinate</td>
<td>0</td>
</tr>
<tr>
<td>B.</td>
<td>Can germinate in vegetated areas but in a narrow range or in special conditions</td>
<td>2</td>
</tr>
<tr>
<td>C.</td>
<td>Can germinate in existing vegetation in a wide range of conditions</td>
<td>3</td>
</tr>
<tr>
<td>U.</td>
<td>Unknown</td>
<td></td>
</tr>
</tbody>
</table>

**Documentation:**
Describe germination requirements:
Japanese knotweed can germinate in vegetated areas. Seeds require chilling to break dormancy (Beerling et al. 1994, Densmore et al. 2001).

**Rational:**

**Sources of information:**

---

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

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>B.</td>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>U.</td>
<td>Unknown</td>
<td></td>
</tr>
</tbody>
</table>

**Documentation:**
Species: *Polygonum perfoliatum* L., *P. polystachyum* Wallich ex Meisn., and *P. sachalinense* F. Schmidt ex Maxim. are declared noxious in a number of American states (Rice 2006, USDA, NRSC 2006). Also *Polygonum arenastrum* Jord. ex Boreau, *P. caespitosum* Blume, *P. convolvulus* L., *P. persicaria* L., *P. lapathifolium* L., *P. orientale* L., and *P. aviculare* L. are listed as a weeds in the PLANTS Database (USDA, NRSC 2006). A number of *Polygonum* species native to North America 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 genera: *Polygonum*, *Fallopia* and *Persicaria* (FNA 1993+), they are closely related taxa and can be considered as congeneric weeds.

**Sources of information:**
- Rice, P.M. 2006. INVADERS Database System (http://invader.dbs.umt.edu). Division of Biological Sciences, University of Montana, Missoula, MT 59812-4824.

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

**Documentation:**

**Describe type of habitat:**
Japanese knotweed often found near water sources, such as along streams and rivers, in waste places, utility rights-of-way, neglected gardens, and around old homesites (Beerling et al. 1994, Densmore et al. 2001, Seiger 1991).

**Rational:**

**Sources of information:**

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

**Documentation:**

**Identify reason for selection, or evidence of weedy history:**
Japanese knotweed has been planted as ornamental (Densmore et al. 2001, Seiger 1991).

**Rational:**

**Sources of information:**
3.2. Known level of impact in natural areas

A. Not known to cause impact in any other natural area

B. Known to cause impacts in natural areas, but in dissimilar habitats and climate zones than exist in regions of Alaska

C. Known to cause low impact in natural areas in similar habitats and climate zones to those present in Alaska

D. Known to cause moderate impact in natural areas in similar habitat and climate zones

E. Known to cause high impact in natural areas in similar habitat and climate zones

U. Unknown

Score 6

Documentation:
Identify type of habitat and states or provinces where it occurs:

Japanese knotweed has invaded rivers bars in Sitka National Historical Park (Densmore et al. 2001) and has established additional infestations in the Tongass National Forest (Stensvold 2000). Large stands have been found along the river banks in Pennsylvania and Ohio (Seiger 1991).

Sources of information:


3.3. Role of anthropogenic and natural disturbance in establishment

A. Requires anthropogenic disturbances to establish

B. May occasionally establish in undisturbed areas but can readily establish in areas with natural disturbances

C. Can establish independent of any known natural or anthropogenic disturbances

U. Unknown

Score 5

Documentation:
Identify type of disturbance:

Japanese knotweed can establish in native habitats (Stensvold 2000, Shaw and Seiger 2002).

Sources of information:


3.4. Current global distribution

A. Occurs in one or two continents or regions (e.g., Mediterranean region)

B. Extends over three or more continents

C. Extends over three or more continents, including successful introductions in arctic or subarctic regions

U. Unknown

Score 3
3.5. Extent of the species U.S. range and/or occurrence of formal state or provincial listing

A. 0-5% of the states
B. 6-20% of the states
C. 21-50%, and/or state listed as a problem weed (e.g., “Noxious,” or “Invasive”) in 1 state or Canadian province
D. Greater than 50%, and/or identified as “Noxious” in 2 or more states or Canadian provinces
U. Unknown

Score 5

4. FEASIBILITY OF CONTROL

4.1. Seed banks

A. Seeds remain viable in the soil for less than 3 years
B. Seeds remain viable in the soil for between 3 and 5 years
C. Seeds remain viable in the soil for 5 years and more
U. Unknown

Score U

### 4.2. Vegetative regeneration

<table>
<thead>
<tr>
<th>Option</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. No resprouting following removal of aboveground growth</td>
<td>0</td>
</tr>
<tr>
<td>B. Resprouting from ground-level meristems</td>
<td>1</td>
</tr>
<tr>
<td>C. Resprouting from extensive underground system</td>
<td>2</td>
</tr>
<tr>
<td>D. Any plant part is a viable propagule</td>
<td>3</td>
</tr>
<tr>
<td>U. Unknown</td>
<td></td>
</tr>
</tbody>
</table>

**Documentation:**

Describe vegetative response:

Japanese knotweed is capable of regeneration from very small fragments of rhizome (as little as 0.7 grams) (Seiger 1991, Shaw and Seiger 2002).

**Rational:**

Sources of information:


### 4.3. Level of effort required

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

**Documentation:**

Identify types of control methods and time-term required:


**Rational:**

Sources of information:


References:


Rice, P.M. 2006. INVADERS Database System (http://invader.dbs.umt.edu). Division of Biological Sciences, University of Montana, Missoula, MT 59812-4824.


