

ALASKA NON-NATIVE PLANT INVASIVENESS RANKING FORM

Botanical name: *Iris pseudacorus* L.

Common name: yellow flag iris

Assessors:

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Date: 12/2/2010

Date of previous ranking, if any: 4T

OUTCOME SCORE:

CLIMATIC COMPARISON

This species is present or may potentially establish in the following eco-geographic regions:

Pacific Maritime	<u>Yes</u>
Interior-Boreal	<u>Yes</u>
Arctic-Alpine	<u>Yes</u>

INVASIVENESS RANKING

	Total (total answered points possible ¹)	Total
Ecological impact	40 (<u>40</u>)	<u>24</u>
Biological characteristics and dispersal ability	25 (<u>25</u>)	<u>15</u>
Ecological amplitude and distribution	25 (<u>25</u>)	<u>21</u>
Feasibility of control	10 (10)	<u>6</u>
Outcome score	100 (<u>100</u>) ^b	<u>66</u> ^a
Relative maximum score ²		<u>66</u>

¹ For questions answered “unknown” do not include point value for the question in parentheses for “total answered points possible.”
² Calculated as $a/b \times 100$

A. CLIMATIC COMPARISON

1.1. Has this species ever been collected or documented in Alaska?

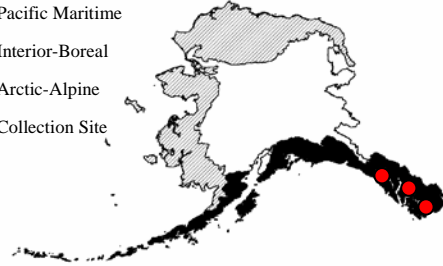
- Yes - continue to 1.2
 No - continue to 2.1

1.2. From which eco-geographic region has it been collected or documented (see inset map)?

Proceed to Section B. INVASIVENESS RANKING

- Pacific Maritime
 Interior-Boreal
 Arctic-Alpine

- Pacific Maritime
 Interior-Boreal
 Arctic-Alpine
 Collection Site



Documentation: *Iris pseudacorus* has been documented from the Pacific Maritime ecogeographic region of Alaska (AKEPIC 2010).

2.1. Is there a 40 percent or higher similarity (based on CLIMEX climate matching, see references) between climates where this species currently occurs and:

- a. Juneau (Pacific Maritime region)?
 Yes – record locations and percent similarity; proceed to Section B.
 No
- b. Fairbanks (Interior-Boreal region)?
 Yes – record locations and percent similarity; proceed to Section B.
 No
- c. Nome (Arctic-Alpine region)?
 Yes – record locations and percent similarity; proceed to Section B.
 No

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

Documentation: Although *Iris pseudacorus* grows as far north as 68°N in coastal Norway, it is likely intolerant of low temperatures (Sutherland 1990). However, it is known to grow in several locations in Finland that have 40% or greater climatic similarities with Fairbanks and Nome (CLIMEX 1999, NatureGate 2011). It has been documented from a site 6 km south of Uppsala, Sweden, which has a 44% climatic similarity with Fairbanks and a 47% climatic similarity with Nome (CLIMEX 1999, Artdatabanken 2010). However, the establishment of *Iris pseudacorus* is probably restricted to coastal communities in the Arctic-Alpine ecogeographic region (Carlson pers. obs.).

B. INVASIVENESS RANKING

1. Ecological Impact

1.1. Impact on Natural Ecosystem Processes

- | | | |
|----|---|---|
| a. | No perceivable impact on ecosystem processes | 0 |
| b. | Has the potential to influence ecosystem processes to a minor degree (e.g., has a perceivable but mild influence on soil nutrient availability) | 3 |

- c. Has the potential to cause significant alteration of ecosystem processes (e.g., increases sedimentation rates along streams or coastlines, degrades habitat important to waterfowl) 7
 - d. Has the potential to cause major, possibly irreversible, alteration or disruption of ecosystem processes (e.g., the species alters geomorphology, hydrology, or affects fire frequency thereby 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
 - e. Unknown U
- Score 7

Documentation: *Infestations of *Iris pseudacorus* may alter natural successional processes (Stone 2009). They can increase sedimentation rates and reduce water flow in small streams. Rhizome growth compacts soil and prevents erosion (Tu et al. 2003, Stone 2009).*

1.2. Impact on Natural Community Structure

- a. No perceived impact; establishes in an existing layer without influencing its structure 0
 - b. Has the potential to influence structure in one layer (e.g., changes the density of one layer) 3
 - c. Has the potential to cause significant impact in at least one layer (e.g., creation of a new layer or elimination of an existing layer) 7
 - d. Likely to cause major alteration of structure (e.g., covers canopy, eliminating most or all lower layers) 10
 - e. Unknown U
- Score 5

Documentation: **Iris pseudacorus* has the potential to form extensive, monotypic stands that increase the density of vegetation in waterways and along shores (Stone 2009).*

1.3. Impact on Natural Community Composition

- a. No perceived impact; causes no apparent change in native populations 0
 - b. Has the potential to influence community composition (e.g., reduces the population size of one or more native species in the community) 3
 - c. Has the potential to significantly alter community composition (e.g., significantly reduces the population size of one or more native species in the community) 7
 - d. Likely to cause major alteration in community composition (e.g., results in the extirpation of one or more native species, thereby reducing local biodiversity and/or shifting the community composition towards exotic species) 10
 - e. Unknown U
- Score 7

Documentation: **Iris pseudacorus* can grow in dense stands that reduce populations of native species in wet areas (Tu et al. 2003, Stone 2009, Morgan 2010). It may impede the establishment and seedling survival of *Salix* species (Tu et al. 2003, Stone 2009).*

1.4. Impact on associated 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. Has the potential to cause minor alteration (e.g., causes a minor reduction in nesting or foraging sites) 3
- c. Has the potential to cause moderate alteration (e.g., causes a moderate reduction in habitat connectivity, interferes with native pollinators, or introduces injurious components such as spines, toxins) 7
- d. Likely to cause severe alteration of associated trophic populations (e.g., extirpation or endangerment of an existing native species or population, or significant reduction in nesting or foraging sites) 10
- e. Unknown U

Score

5

Documentation: *Iris pseudacorus* produces glycosides that are poisonous when consumed by most vertebrates (Sutherland 1990). Infestations can degrade stream habitats important to salmon (King County 2009) and reduce the populations of plant species that provide important food sources to waterfowl (Tu et al. 2003, Stone 2009) and possibly other animals as well. Many insect herbivores feed on this species, and it is associated with a large number of plant parasites. *Pseudomonas iridis* causes iris root rot disease in this plant. *Iris pseudacorus* reduces bacteria populations when growing in water (Sutherland 1990). The flowers are attractive to hummingbirds and butterflies (Stone 2009) and are visited by many pollinating insect species, including bumblebees (*Bombus* species) and non-native honey bees (*Apis mellifera*) (Sutherland 1990). Therefore, the presence of *Iris pseudacorus* may alter native plant-pollinator interactions.

Total Possible

40

Total

24

2. Biological Characteristics and Dispersal Ability

2.1. Mode of reproduction

- a. Not aggressive (produces few seeds per plant [0-10/m²] and not able to reproduce vegetatively). 0
- b. Somewhat aggressive (reproduces by seed only [11-1,000/m²]) 1
- c. Moderately aggressive (reproduces vegetatively and/or by a moderate amount of seed [<1,000/m²]) 2
- d. Highly aggressive (extensive vegetative spread and/or many seeded [>1,000/m²]) 3
- e. Unknown U

Score

2

Documentation: *Iris pseudacorus* reproduces sexually by seeds and vegetatively from rhizomes in a radial pattern. Rhizomes fragment after approximately ten years. Hundreds of flowering plants can be interconnected by rhizome networks (Sutherland 1990, Stone 2009). Paleyellow iris produced 400 to 480 seeds per plant in Britain (Sutherland 1990) and 150 to 240 seeds per plant in Montana (Stone 2009). The importance of vegetative and sexual reproduction is environmentally dependant. In a salt marsh in Ireland, plants propagated mainly by rhizomes in the upper levels of the marsh, whereas many of the plants in the lower levels of the marsh were seedlings (Sutherland and Walton 1990).

2.2. Innate potential for long-distance dispersal (wind-, water- or animal-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
 - d. Unknown U
- Score 3

Documentation: Most seeds can remain floating for two months. They can germinate after being soaked in seawater for 31 days (Sutherland 1990). Seeds and rhizome fragments are spread in waterways and by floods. Seeds germinate along shorelines when water levels recede (Coops and van der Velde 1995, Stone 2009).

2.3. *Potential to be spread by human activities (both directly and indirectly – possible mechanisms include: commercial sale of species, use as forage or for revegetation, dispersal along highways, transport on boats, common contaminant of landscape materials, etc.).*

- a. Does not occur 0
 - b. Low (human dispersal is infrequent or inefficient) 1
 - c. Moderate (human dispersal occurs regularly) 2
 - d. High (there are numerous opportunities for dispersal to new areas) 3
 - e. Unknown U
- Score 2

Documentation: *Iris pseudacorus* is grown in the U.S. as an ornamental plant and is able to escape cultivation (Stone 2009, Morgan 2010). Several infestations in southeast Alaska appear to be associated with ornamental plantings (AKEPIC 2010).

2.4. *Allelopathic*

- a. No 0
 - b. Yes 2
 - c. Unknown U
- Score 0

Documentation: No evidence suggests that *Iris pseudacorus* is allelopathic.

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 able to fix nitrogen 3
 - d. Unknown U
- Score 1

Documentation: *Iris pseudacorus* is a fast-growing, perennial plant. It can displace native vegetation in wet areas (Tu et al. 2003, Stone 2009, Morgan 2010).

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

- a. Does not grow densely or above surrounding vegetation 0
- b. Forms dense thickets 1

- c. Has a climbing or smothering growth habit, or is otherwise taller than the surrounding vegetation 2
 - d. Unknown U
- Score 1

Documentation: *Iris pseudacorus* spreads radially by rhizomes to form dense stands that can displace native plant species (Tu et al. 2003, Stone 2009, Morgan 2010).

2.7. Germination requirements

- a. Requires sparsely vegetated soil and disturbance to germinate 0
 - b. Can germinate in vegetated areas, but in a narrow range of or in special conditions 2
 - c. Can germinate in existing vegetation in a wide range of conditions 3
 - d. Unknown U
- Score 0

Documentation: *Iris pseudacorus* requires open soil for germination. Disturbances, often in the form of flooding, are necessary for the establishment of this species (Coops and van der Velde 1995, Stone 2009).

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

- a. No 0
 - b. Yes 3
 - c. Unknown U
- Score 3

Documentation: *Iris douglasiana* and *I. missouriensis* are both problematic, non-native species that are considered noxious weeds in California (DiTomaso and Healy 2007, Invaders 2010, USDA 2010).

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
 - d. Unknown U
- Score 3

Documentation: In North America, *Iris pseudacorus* grows in wetlands, floodplains, swamps, river banks, lake shores, freshwater and brackish cattail marshes, moist ditches, sloughs, and rocky coasts (Henderson 2002, Stone 2009, Klinkenberg 2010). It tolerates fluctuating water levels and can grow in water up to 25 cm deep (Sutherland 1990, Stone 2009). This species can survive as mats floating in water, and the rhizomes can grow over submerged rocks with roots penetrating between rocks to underlying soil (Sutherland 1990).

Total Possible	25
Total	15

3. Ecological Amplitude and Distribution

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

- a. Is not associated with agriculture 0
- b. Is occasionally an agricultural pest 2
- c. Has been grown deliberately, bred, or is known as a significant agricultural pest 4
- d. Unknown U

Score

4

Documentation: *Iris pseudacorus* is often deliberately grown in ponds and gardens as an ornamental plant. Many different cultivars have been developed (Sutherland 1990, Tu et al. 2003, Morgan 2010). This species has also been planted purposely to control erosion and to remove metals from water in sewage treatment plants (Tu et al. 2003).

3.2. *Known level of ecological impact in natural areas*

- a. Not known to impact other natural areas 0
- b. Known to impact other natural areas, but in habitats and climate zones dissimilar to those in Alaska 1
- c. Known to cause low impact in natural areas in habitats and climate zones similar to those in Alaska 3
- d. Known to cause moderate impact in natural areas in habitat and climate zones similar to those in Alaska 4
- e. Known to cause high impact in natural areas in habitat and climate zones similar to those in Alaska 6
- f. Unknown U

Score

4

Documentation: *Iris pseudacorus* invades wetland and riparian communities throughout the United States (Stone 2009). It degrades important habitats for salmon in streams in Washington (King County 2009). In Connecticut and on Theodore Roosevelt Island in the Potomac River, the establishment of *Iris pseudacorus* reduced populations of the native plant *Peltandra virginica*, an important food source for the wood duck (Tu et al. 2003, Stone 2009). Along the Potomac River, infestations of *Iris pseudacorus* contributed to the conversion of riparian marshes to mesic woodlands. *Iris pseudacorus* also displaces native plant species in brackish coastal marshes in Oregon (Tu et al. 2003).

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

- a. Requires anthropogenic disturbance to establish 0
- b. May occasionally establish in undisturbed areas, readily establishes in naturally disturbed areas 3
- c. Can establish independently of natural or anthropogenic disturbances 5
- e. Unknown U

Score

3

Documentation: Although all infestations recorded in Alaska are associated with anthropogenic disturbances (AKEPIC 2010), *Iris pseudacorus* establishes in areas that have been naturally disturbed by the movement of water in much of North America (Coops and van der Velde 1995, Stone 2009).

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
 - e. Unknown U
- Score 5

Documentation: *Iris pseudacorus* is native to Europe, North Africa, and temperate Asia. It has been introduced to North America and New Zealand. Populations have been documented in coastal Norway as far north as 68°N (Sutherland 1990, Stone 2009).

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

- a. Occurs in 0-5 percent of the states 0
 - b. Occurs in 6-20 percent of the states 2
 - c. Occurs in 21-50 percent of the states and/or listed as a problem weed (e.g., “Noxious,” or “Invasive”) in one state or Canadian province 4
 - d. Occurs in more than 50 percent of the states and/or listed as a problem weed in two or more states or Canadian provinces 5
 - e. Unknown U
- Score 5

Documentation: *Iris pseudacorus* grows in 41 states of the U.S. (USDA 2010). It is considered a noxious weed in Montana, Oregon, and Washington (Invaders 2010, USDA 2010), an invasive weed in Connecticut and New Hampshire, and a prohibited weed in Massachusetts (USDA 2010).

Total Possible	25
Total	21

4. Feasibility of Control

4.1. *Seed banks*

- a. Seeds remain viable in the soil for less than three years 0
 - b. Seeds remain viable in the soil for three to five years 2
 - c. Seeds remain viable in the soil for five years or longer 3
 - e. Unknown U
- Score 0

Documentation: Seeds are known to remain viable for at least one year, but there is no indication that they remain viable for more than three years or that they form long-lived seed banks (Sutherland 1990, Stone 2009).

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
 - e. Unknown U
- Score 2

Documentation: *Iris pseudacorus* resprouts from rhizomes following the removal of the aboveground growth (Morgan 2010). New plants can regenerate from rhizome fragments (Tu et al. 2003, Stone 2009).

4.3. Level of effort required

- | | | |
|----|--|---|
| a. | Management is not required (e.g., species does not persist in the absence of repeated anthropogenic disturbance) | 0 |
| b. | Management is relatively easy and inexpensive; requires a minor investment of human and financial resources | 2 |
| c. | Management requires a major short-term or moderate long-term investment of human and financial resources | 3 |
| d. | Management requires a major, long-term investment of human and financial resources | 4 |
| e. | Unknown | U |

Score

4

Documentation: Mechanical control methods that remove the entire plant and rhizome system can successfully control small infestations. Controlled areas should be revisited to remove plants resprouting from rhizome fragments. Repeated mowing or cutting of plants before seed set can prevent the spread of *Iris pseudacorus* by seed and may eventually kill plants, especially if they are cut below the water surface (King County 2009, Stone 2009). This species can be controlled by the application of herbicides, but it is resistant to Terbutryne (Sutherland 1990). Glyphosate, 1% imazapyr with 1% non-ionic surfactant, or 1% imazapyr with 2.5% glyphosate can effectively control infestations. Cutting followed by herbicide application is an effective combination of mechanical and chemical control methods (Tu et al. 2003, King County 2009).

Total Possible	10
Total	6

Total for four sections possible	100
Total for four sections	66

References:

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