

ALASKA NON-NATIVE PLANT INVASIVENESS RANKING FORM

Botanical name: *Hedera helix* L.

Common name: English ivy

Assessors:

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Date: 12/1/2010

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>No</u>
Arctic-Alpine	<u>No</u>

INVASIVENESS RANKING

	Total (total answered points possible ¹)	Total
Ecological impact	40 (<u>40</u>)	<u>27</u>
Biological characteristics and dispersal ability	25 (<u>23</u>)	<u>16</u>
Ecological amplitude and distribution	25 (<u>25</u>)	<u>23</u>
Feasibility of control	10 (10)	<u>6</u>
Outcome score	100 (<u>98</u>) ^b	<u>72</u> ^a
Relative maximum score ²		<u>73</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

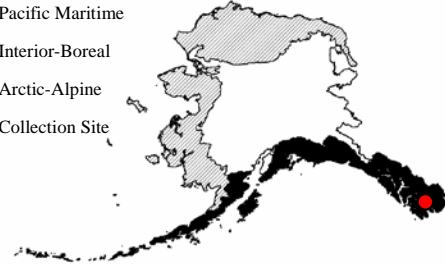
Arctic-Alpine

Pacific Maritime

Interior-Boreal

Arctic-Alpine

Collection Site



Documentation: *Hedera helix* is known from two locations in Ketchikan in the Pacific Maritime eco-geographic region of Alaska (AKEPIC 2010).

Note on Taxonomy: Approximately 500 cultivars of *Hedera helix* have been developed by horticulturalists, and all have differing morphological and ecological traits. The most invasive of these cultivars is Atlantic Ivy (Irish Ivy), which is treated by some taxonomists as *H. hibernica* and by others as *H. helix* ssp. *hibernica*. Atlantic Ivy is treated here as a subspecies of *H. helix* (Metcalf 2005, DiTomaso and Healy 2007).

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: *Hedera helix* has been documented from Uppsala, Sweden, which has a 42% climatic similarity with Nome (CLIMEX 1999, Artdatabanken 2010). It has been documented from a site 12 km southeast of Lærdalsøyri, Norway, and from Jönköping, Sweden, which have 45% and 44% climatic similarities with Nome, respectively (CLIMEX 1999, Herbarium of Oskarshamn 2010, University Museums of Norway 2010). However, this species is rare north of 60°32'N in Scandinavia. The development and fruiting of *Hedera helix* is limited in areas where the mean temperature of the coldest month is less than -1.5°C, and this species is intolerant of areas where the mean temperature of the coldest month is less than -2°C (Metcalf 2005). Therefore, *Hedera helix* is not likely to establish in the Interior-Boreal or Arctic-Alpine eco-geographic regions of Alaska.

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

5

Documentation: *Hedera helix* can change the natural successional processes of forests. It limits the regeneration of understory species by outshading surrounding vegetation. This species also limits soil moisture and nutrient availability (Simon 2004, Waggy 2010).

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

8

Documentation: *Hedera helix* forms dense mats of foliage (Biggerstaff and Beck 2007, DiTomaso and Healy 2007, Swearingen and Diedrich 2009, Waggy 2010). Climbing stems form new mid to upper canopy layers, progressively killing host trees (Hyland and Roye 2005, Oregon State University 2008, Swearingen and Diedrich 2009, Waggy 2010). This species has the potential to increase the density of vegetation in understory, shrub, and tree layers in forests in southeast Alaska at low elevations.

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) | 10 |

and/or shifting the community composition towards exotic species)

e. Unknown

U
Score

7

Documentation: *Hedera helix* forms dense, creeping, sometimes monotypic mats of foliage that significantly reduce the growth rates and population sizes of tree and shrub seedlings and forbs. Climbing stems can reach the canopies of mature trees and outshade deciduous foliage during summer months, progressively killing host trees (Simon 2004, Hyland and Roye 2005, DiTomaso and Healy 2007, Oregon State University 2008, Jones et al. 2010, Waggy 2010). *Hedera helix* can dominate secondary woodlands and decrease the diversity of native plant communities (Biggerstaff and Beck 2007, Waggy 2010).

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

7

Documentation: *Hedera helix* is mildly poisonous to humans and cattle if consumed in large quantities. Contact with the sap can cause dermatitis in some people (DiTomaso and Healy 2007, Waggy 2010). Expansive monocultures of *Hedera helix* reduce available habitat for wildlife in California and the Pacific Northwest (Hyland and Roye 2005, Oregon State University 2008) and decrease the local diversity of animal species (Waggy 2010). Deer, sheep, and birds consume *Hedera helix*. Flowers are pollinated by many species of insects but primarily by flies in northern latitudes. Roots are associated with mycorrhizal fungi (Metcalf 2005, Waggy 2010). This species is a known host for many nematodes, insect pests, and harmful fungi. It has been associated with several plant diseases (Metcalf 2005, Pennisi et al. 2009, Swearingen and Diedrich 2009).

Total Possible	40
Total	27

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 [$>1,000/m^2$]) 3
 - e. Unknown U
- Score 3

Documentation: Juvenile plants reproduce vegetatively by rooting at the nodes of creeping stems, and adult plants can reproduce vegetatively by forming new shoots. Only the erect stems of adult plants, which usually require at least ten years to reach maturity, reproduce sexually. Usually, only one umbel (which consists of approximately 20 flowers) per panicle develops fruit (Metcalf 2005). Adult plants can produce thousands of fruits per year, with two to several seeds per fruit (DiTomaso and Healy 2007). However, at the northern limit of its geographical distribution, *Hedera helix* is propagated primarily by vegetative reproduction. Established populations expand primarily through vegetative reproduction while new populations are established primarily from seeds (Metcalf 2005).

- 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 2

Documentation: Seeds are primarily dispersed by birds after being ingested in winter or spring. Birds can transport seeds from gardens to natural areas (Hyland and Roye 2005, Metcalf 2005, DiTomaso and Healy 2007, Waggy 2010). Seeds can be regurgitated by birds (Waggy 2010), or several seeds can be deposited in a single bird dropping. Deer and martens also ingest fruits and disperse seeds. However, at the northern limit of its geographical distribution, *Hedera helix* rarely produces seeds and in some cases is incapable of sexual reproduction (Metcalf 2005).

- 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: *Hedera helix* is cultivated as an ornamental plant, and many different cultivars have been developed in the U.S. (Pennisi et al. 2009, Waggy 2010). This species was found growing in front of a private residence in Ketchikan in 2006 (AKEPIC 2010). It escapes cultivation, especially near coastal areas (DiTomaso and Healy 2007, Waggy 2010).

- 2.4. *Allelopathic*
- a. No 0
 - b. Yes 2

c. Unknown

U
Score

Documentation: When grown in pots in a greenhouse, *Hedera helix* appeared to slightly hinder the germination of *Coreopsis lanceolata*, a perennial forb common in forests in the southeastern U.S.; however, these results were only marginally significant, and the hindrance in germination could be attributed to physical competition (Biggerstaff and Beck 2007).

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

Documentation: Because *Hedera helix* has a climbing growth habit, it can overtop and outshade other plants (Metcalf 2005). It competes well with other woodland ground species and can form extensive monocultures, displacing native plant species (Waggy 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

Documentation: *Hedera helix* can climb trees, cliffs, and walls, and it can overtop and outshade native plant species. Seedlings have been observed growing at densities of up to 50 stems per square meter (Metcalf 2005). This species can form dense mats in forest understories, reducing the growth rates and populations of tree seedlings and forbs (Jones et al. 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

Documentation: *Hedera helix* germinates most readily in disturbed areas or sparsely vegetated habitats (Metcalf 2005, Waggy 2010). It readily colonizes naturally disturbed woodlands and can establish in shaded conditions under evergreen canopies (Metcalf 2005).

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

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

Score

0

Documentation: *Hedera colchica* is known to occur as a non-native species in Arizona, North Carolina, and South Carolina (USDA 2010), but it has not been documented as being invasive or growing outside of cultivation.

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

2

Documentation: *Hedera helix* is known to invade riparian areas in California, Oregon, North Dakota, and South Dakota (Hyland and Roye 2005, Fierke and Kauffman 2006, DiTomaso and Healy 2007, Ringold et al. 2008, Waggy 2010). It grows on the edges of wetland communities in California and Virginia and on the edges of salt marshes in the mid-Atlantic U.S. (Swearingen and Diedrich 2009, Waggy 2010).

Total Possible

23

Total

16

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: *Hedera helix* is grown commercially and planted as a landscape ornamental in the U.S. (DiTomaso and Healy 2007, Pennisi et al. 2009, Waggy 2010).

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

6

Documentation: *Hedera helix* causes reductions in the biodiversity of native plant communities in the southeastern U.S., California, and the Pacific Northwest (Hyland and Roye 2005, Biggerstaff and Beck 2007, Waggy 2010). It establishes in natural areas in the Pacific Northwest

at elevations less than 900 m, where it changes the natural successional processes of forests and outshades trees, shrubs, and forest floors (Simon 2004, Oregon State University 2008, Jones et al. 2010).

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

5

Documentation: *Hedera helix* does not readily germinate in heavily vegetated areas; however, once established, it may spread vegetatively into undisturbed areas. It readily colonizes naturally disturbed woodlands and can establish in shaded conditions under evergreen canopies (Metcalf 2005). This species has invaded many natural habitats in the Pacific Northwest (Simon 2004, Oregon State University 2008). In California, it has established in intact plant communities away from roads and trails at the base of trees where birds perch (Hyland and Roye 2005).

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

3

Documentation: *Hedera helix* is native to Europe, North Africa, and parts of Asia Minor. It has been introduced to North America, South America, Australia, New Zealand, India, and South Africa. This species rarely grows north of 60°32'N in Scandinavia and has not been documented from arctic or subarctic regions (Metcalf 2005).

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: *Hedera helix* grows in 31 states of the U.S. (USDA 2010). It is considered a noxious weed in Oregon and Washington (Invaders 2010, USDA 2010).

Total Possible	25
Total	23

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 <input type="text" value="0"/> |

Documentation: Most seeds germinate six to 14 days after dispersal. *Hedera helix* does not form persistent seed banks (Metcalf 2005, Waggy 2010).

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 <input type="text" value="3"/> |

Documentation: *Hedera helix* can be propagated from tip or node cuttings (Pennisi et al. 2009). Stem fragments in contact with moist soil can form new plants (DiTomaso and Healy 2007, Swearingen and Diedrich 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 <input type="text" value="3"/> |

Documentation: Manual removal of *Hedera helix* is labor intensive but can be effective. Covering infested areas with several inches of mulch can control creeping populations. Regularly repeated mowing can contain creeping infestations when the clippings are removed. Mowing is more effective when combined with herbicide treatments or mulching (Simon 2004, Shaw pers. comm.). Roots can be hand pulled or dug out. Climbing stems should be chopped to kill vines on trees. The thick, waxy cuticles on the leaves reduce the absorption and effectiveness of foliar herbicide applications. Herbicides are most effective when applied to recovering plant tissues after mechanical removal efforts (Simon 2004, DiTomaso and Healy 2007). Applying herbicides directly to cut stem surfaces is often the most effective way to control populations with thick stems or vines (Swearingen and Diedrich 2009). Foliar applications of glyphosate or triclopyr herbicides (at 2% to 5% solutions) can kill *Hedera helix* (Oregon State University 2008, Swearingen and Diedrich 2009), especially when applied on sunny, warm, winter days (Oregon State University 2008). Controlled areas should be revisited for at least one year following any control efforts (Oregon State University 2008).

Total

6

Total for four sections possible

98

Total for four sections

72

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