ALASKA NON-NATIVE PLANT INVASIVENESS RANKING FORM

Botanical name: *Rosa rugosa* Thunb.
Common name: rugosa rose
Assessors:

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Date: 10/19/2010
Date of previous ranking, if any: 5T

OUTCOME SCORE:

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

Pacific Maritime	Yes
Interior-Boreal	Yes
Arctic-Alpine	Yes

INVASIVENESS RANKING	**Total** (total answered points possible[1])	**Total**
Ecological impact	40 (40)	28
Biological characteristics and dispersal ability	25 (25)	16

Ecological amplitude and distribution	25 (25)	20
Feasibility of control	10 (7)	6
Outcome score	100 (97)[b]	70[a]
Relative maximum score[2]		**72**

[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 × 100

A. CLIMATIC COMPARISON

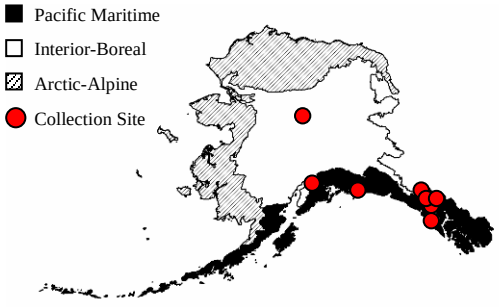
1.1. Has this species ever been collected or documented in Alaska?

☒ 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. INVASIVNESS RANKING

☒ Pacific Maritime
☒ Interior-Boreal
☐ Arctic-Alpine



Documentation: *Rosa rugosa* has been documented from the Pacific Maritime and Interior-Boreal ecogeographic regions of Alaska (AKEPIC 2010, UAM 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: *Rosa rugosa* has been documented from a site near Pielisjärvi, Finland, which has a 58% climatic similarity with Nome according to CLIMEX. It has also been documented from Chirka-kem' and Vologda, Russia, which have 77% and 63% climatic similarities with Nome, respectively (CLIMEX 1999, Bruun 2005).

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: *Rosa rugosa* may increase the concentrations of some nutrients in the top soil layer in coastal habitats. It has deep roots that reach lower soil layers to take up nutrients. Nutrients are then redistributed to the surface in the dense organic litter created by this species (Vanderhoeven et al. 2005, Dassonville et al. 2008). *Rosa rugosa* stabilizes its substrate and prevents erosion (Weidema 2006). The establishment of *Rosa rugosa* creates conditions favorable to the establishment of other non-native species (Weidema 2006).

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 **7**

Documentation: *Rosa rugosa* can increase the density of coastal shrubs due to its dense growth habit. It may decrease or eliminate the lower vegetation layers by reducing the amount of light available to native plant species (Weidema 2006, Isermann 2008).

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: Nearly monospecific infestations of *Rosa rugosa* cause significant declines in species diversity in coastal dunes in Europe (Essl 2006, Isermann 2008), and they threaten

numerous rare species populations (Bruun 2005, Gren et al. 2007). Although *Rosa rugosa* does not appear to disperse well in Alaska, it has the potential to displace surrounding vegetation once established (Rapp pers. obs.).

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: *Rosa rugosa* is insect pollinated (Weidema 2006), and its presence may alter native plant-pollinator interactions. In Europe, insects that feed on native *Rosa* species also feed on *Rosa rugosa*, with *Rosa rugosa* becoming the preferred food source in some cases. Birds and small mammals eat the hips (Bruun 2005, Weidema 2006). Only juvenile plants are grazed and browsed by large mammals. *Rosa rugosa* provides additional hosts to wasp species that cause galls on native *Rosa* species. A variety of parasites and diseases affect this species. The roots form mycorrhizal associations. In its native range, *Rosa rugosa* forms hybrids with *Rosa acicularis* (Bruun 2005). It may hybridize with native *Rosa* species, including *Rosa acicularis*, in Alaska.

Total Possible	40
Total	**28**

2. Biological Characteristics and Dispersal Ability

2.1. Mode of reproduction

a.	Not aggressive (produces few seeds per plant [0-10/m^2] and not able to reproduce vegetatively).	0
b.	Somewhat aggressive (reproduces by seed only [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 (extensive vegetative spread and/or many seeded [>1,000/m^2])	3
e.	Unknown	U

Score **3**

Documentation: *Rosa rugosa* can reproduce vegetatively from rhizomes to form large, dense stands (Bruun 2005, Weidema 2006, USDA 2010). Seed production of dense stands in the Russian Far East has been measured from 600 to 1,300 seeds per square meter (Bruun 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 **3**

Documentation: *Rosa rugosa* has been found on isolated Scandinavian islands where direct human dispersal is improbable. Both the seeds and the hips are buoyant and thus can be dispersed by water. Hips can float for 40 weeks, and seeds can float for several weeks. Seeds can germinate even after floating in salt water for weeks. Seeds can be dispersed long distances by birds after being ingested. They are also occasionally dispersed short distances by small mammals after being ingested. Rhizomes can float to new locations and establish new populations (Bruun 2005, Weidema 2006).

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: *Rosa rugosa* is a commonly planted ornamental that frequently escapes cultivation (Bruun 2005, Weidema 2006, Klinkenberg 2010). It has been cultivated in Southeast Alaska since the early 20th Century (Gardner 1968), and it has naturalized near many homes in Gustavus, AK (Rapp 2006). In Denmark, infestations are significantly more common near roads, tracks, and houses in Denmark (Jørgensen and Kollmann 2009).

2.4. Allelopathic

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

Score **0**

Documentation: *Rosa rugosa* is not allelopathic (USDA 2010).

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 **3**

Documentation: *Rosa rugosa* is highly competitive in dunes, coastal grasslands, and rocky beaches in Europe. Only a few species, such as *Chamerion angustifolium*, can compete with dense stands of *Rosa rugosa* (Bruun 2005).

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 **2**

Documentation: *Rosa rugosa* can form very dense thickets by vegetative reproduction. It grows taller than forb and graminoid layers, and it can shade out native vegetation. Few other species can persist in areas where *Rosa rugosa* forms thickets (Bruun 2005, Weidema 2006).

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: In natural settings in its native and non-native ranges, *Rosa rugosa* germinates best in sparsely vegetated areas where bare sand is present (Bruun 2005). Disturbances increase the emergence and survival of seedlings, but the establishment of *Rosa rugosa* is not limited to disturbed areas (Kollmann et al. 2007). Most recorded infestations in Alaska are associated with fill importation along roads (AKEPIC 2010). In Anchorage, Alaska, *Rosa rugosa* has been found along coastal trails (Cortés-Burns and Flagstad 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: *Rosa multiflora* is considered a noxious species in AL, CT, IA, IN, KS, KY, MA, MD, MO, NH, OH, PA, SD, WV, and WI (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 **0**

Documentation: *Rosa rugosa* is problematic in coastal communities but has not been documented from riparian or wetland communities.

Total Possible 25

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: *Rosa rugosa* is a commonly cultivated garden ornamental (Klinkenberg 2010). In the Brandenburger region of Germany, *Rosa rugosa* was cultivated for more than 100 years before becoming invasive, and this species has exhibited a similar, although shorter, lag phase in other areas of Northern Europe as well (Weidema 2006). It has been cultivated in Southeast Alaska since the early 20th Century (Gardner 1968).

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: *Rosa rugosa* forms dense stands on sandy beaches of the east coast of the U.S. and Canada and around the Great Lakes. It can displace native vegetation, slow erosion, provide cover for birds and deer, and provide food for animals (Kaufman and Kaufman 2007). *Rosa rugosa* reduces the diversity of native plant species and increases the density of shrub vegetation in coastal areas in Europe (Weidema 2006, Isermann 2008). In Denmark, *Rosa rugosa* spread on coastal heath from a few infestations to cover a contiguous area of 35,000 square meters. This species threatens the rare species *Silene otites* and *Dianthus carthusianorum* on the North Frisian island of Amrum (Bruun 2005). In Sweden, the native species *Eryngium maritimum* is also endangered by invasions of *Rosa rugosa* (Gren et al. 2007). Although, *Rosa rugosa* causes high impacts in coastal areas of Scandinavia, the quartz-rich, well-drained soil in which this species becomes highly problematic in northern Europe is dissimilar to the soil in most coastal habitats in Alaska. Coastal habitats in Alaska are often composed of finer-grained sediments that impede drainage (Flagstad pers. obs.), and *Rosa rugosa* does not grow well in poorly drained sites (Dickerson and Miller 2002).

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: In northeastern Asia, *Rosa rugosa* grows on stabilized dunes, rocky shores, and coastal meadows. It grows well in similar habitats where it is naturalized, and it establishes in naturally disturbed or sparsely vegetated areas (Bruun 2005, Weidema 2006). This species is primarily associated with anthropogenic disturbances in Alaska (AKEPIC 2010), but it has been observed moving into natural areas in the Gustavus forelands (Rapp pers. obs.).

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: *Rosa rugosa* is native to northeastern Asia. It has been introduced to Europe and North America. This species has been documented from Tromsø in arctic Norway. It is considered most problematic in northern latitude coastal communities in northern Germany, Denmark, Sweden, Norway, and Finland; it is not considered highly invasive in Ireland (Bruun 2005, Weidema 2006).

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 **4**

Documentation: *Rosa rugosa* grows in 21 states of the U.S. It is considered potentially invasive in Connecticut (USDA 2010).

Total Possible 25
Total **20**

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 **U**

Documentation: Seed banks are transient (Kollmann et al. 2009). Quantitative data on the amount of time for which seeds remain viable is not available.

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: *Rosa rugosa* can resprout from its rhizomes following the removal of the aboveground portion. Rhizome fragments can generate new plants (Bruun 2005, Kollmann 2009, USDA 2010).

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: Controlling infestations of *Rosa rugosa* can be difficult, labor-intensive, time-consuming, and expensive. The cost of controlling problematic infestations in Sweden was predicted to be the U.S. equivalent of $177,600 to $2,150,000 (based on the average exchange rate for 2007) per year (Gren et al. 2007). Coastal infestations can be reduced by not planting this species near coastal areas (Weidema 2006). Small plants can be pulled out (Kaufman and Kaufman 2007). Mowing or cutting several times per growing season can reduce the vitality of infestations for a short period of time. Digging is the most effective control method, although it is labor-intensive for large populations. Manual control measures must be repeated where plants regenerate from rhizome pieces. In Finland, an infestation was successfully controlled by removing all soil with an excavator to the depth of rooting and then revisiting the site to dig up plants regenerating from rhizome fragments later in the season (Bruun 2005). Uprooting the plants followed by burying the controlled area has proven moderately successful. While burial decreases the number of resprouting plants, it does not preclude the need to revisit controlled sites to dig up resprouts (Kollmann et al. 2009). Digging combined with herbicide applications has also proven effective. Glyphosate herbicides applied in late summer may damage rhizomes and roots (Bruun 2005, Weidema 2006). Several insect and fungi species have been suggested as potential biological control agents, although it has been noted that the impact of potential biological control agents on native *Rosa* species is unknown (Bruun 2006).

Total Possible	7
Total	**6**

Total for four sections possible	97

Total for four sections **70**

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