

WEED RISK ASSESSMENT FORM

Botanical name: Leucanthemum vulgare Lam.

Common name: Oxeye daisy

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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	
This species is unlikely to establish in any region in Alaska		

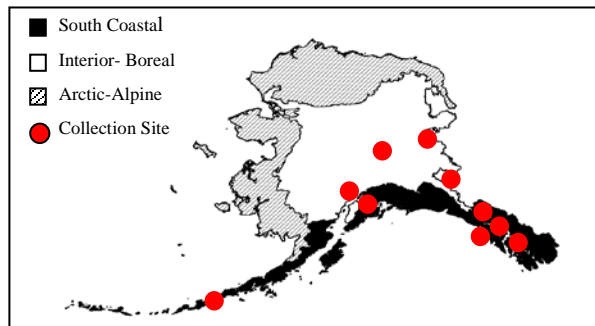
B. Invasiveness Ranking	Total (Total Answered*) Possible	Total
1 Ecological impact	40 (40)	20
2 Biological characteristic and dispersal ability	25 (25)	15
3 Ecological amplitude and distribution	25 (25)	18
4 Feasibility of control	10 (10)	8
Outcome score	100 (100) ^b	61 ^a
Relative maximum score†		0.61

* 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
 Arctic-Alpine



Documentation:
 Has been collected in South Coastal Region, in Juneau, Seward, Ketchikan; in Interior-Boreal Region, in Anchorage and Fairbanks.
Sources of information:
 Densmore, R. V., P. C. McKee, C. Roland. 2001. Exotic plants in Alaskan National Park Units. Report on file with the National Park Service – Alaska Region, Anchorage, Alaska. 143 pp.
 Furbish, C.E. 2001. Exotic plant survey of the Chilkoot Trail Unit, Klondike Gold Rush National Historical Park. Natural Resources Management Program. 49 pp.
 Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 p.
 University of Alaska Museum. University of Alaska Fairbanks. 2003.
 Welsh, S. L. 1974. Anderson's flora of Alaska and adjacent parts of Canada. Brigham University Press. 724 pp.

- 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 – record locations and similarity; proceed to Section B. Invasiveness Ranking
 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 high. Range of the species includes Kirov, Russia, Fort McMurray, Alberta, and Anchorage, Alaska (Hultén 1968), which has a 66%, 63%, and 61% climatic match with Nome, respectively.
Sources of information:
 CLIMEX for Windows, Version 1.1a. 1999. CISRO Publishing, Australia.
 Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 p.

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

5

Documentation:
 Identify ecosystem processes impacted:
 Oxeye daisy increases the potential for soil erosion in heavily infested areas (Densmore et al. 2001, Noxious Weed Control Board 2005).
 Rational:

Sources of information:
 Densmore, R. V., P. C. McKee, C. Roland. 2001. Exotic plants in Alaskan National

Park Units. Report on file with the National Park Service – Alaska Region, Anchorage, Alaska. 143 pp.
 Noxious Weed Control Board. Washington State. 2005.
<http://www.nwcb.wa.gov/INDEX.htm>

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 3

Documentation:

Identify type of impact or alteration:

Oxeye daisy can form dense population (Noxious Weed Control Board 2005).

Rational:

Sources of information:

Noxious Weed Control Board. Washington State. 2005.

<http://www.nwcb.wa.gov/INDEX.htm>

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 5

Documentation:

Identify type of impact or alteration:

Oxeye daisy can decrease native plant species diversity. It is able to replace up to 50% of the grass species in pasture (Royer and Dickinson 1999, Warner et al. 2003).

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.

Warner, P.J., C.C. Bossard, M.L. Brooks, J.M. DiTomaso, J.A. Hall, A.M. Hawald, D.W. Johnson, J.M. Randall, C.L. Roye, M.M. Ryan, and A.E. Stanton. 2003. Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands. (www.caleppc.org and www.swvma.org. California Exotic Pest Plant Council and Southwest Vegetation Management Association. 24 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 7

Documentation:

Identify type of impact or alteration:

The entire plant has a disagreeable odor and grazing animals avoid it. Moreover, the plant contains polyacetylenes and thiophenes that are generally highly toxic to insect herbivores. Oxeye daisy can host chrysanthemum stunt, aster yellows, tomato aspermy viruses (Royer and Dickinson 1999), and several nematode species (Townshend and Davidson 1962).

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.

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.

Total Possible	40
Total	20

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/m²) 1
- 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

Score

3

Documentation:

Describe key reproductive characteristics (including seeds per plant):

Oxeye daisy can spread both vegetatively and by seed. Stevens (1932) found the number of seeds per plant with 3 heads was 510. Dorph-Peterson (cited in Howarth and Welliams 1968) reported seed production of 1300 - 4000 fruits per plant; and up to 26,000 fruits per vigorous plant.

Rational:

Sources of information:

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

Howarth, S.E. and J.T. Welliams. 1968. Biological flora of the British Isles.

Chrysanthemum leucanthemum L. Journal of Ecology 56:585-595.

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

2

Documentation:

Identify dispersal mechanisms:

Seeds have no special adaptations to aid dispersal, but they are small and water, wind, and animals can carry seeds into new areas (Noxious Weed Control Board 2005, Warner et al. 2003).

Rational:

Sources of information:

Noxious Weed Control Board. Washington State. 2005.

<http://www.nwcb.wa.gov/INDEX.htm>

Warner, P.J., C.C. Bossard, M.L. Brooks, J.M. DiTomaso, J.A. Hall, A.M. Hawald, D.W. Johnson, J.M. Randall, C.L. Roye, M.M. Ryan, and A.E. Stanton. 2003 Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands. (www.caleppc.org and www.swvma.org. California Exotic Pest Plant Council and Southwest Vegetation Management Association. 24 pp.

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 can be dispersed with timber, contaminated forage grass and legume seed. Plants also continue to appear for sale in nurseries (Noxious Weed Control Board 2005, Warner et al. 2003).

Rational:

Sources of information:

Noxious Weed Control Board. Washington State. 2005.

<http://www.nwcb.wa.gov/INDEX.htm>

Warner, P.J., C.C. Bossard, M.L. Brooks, J.M. DiTomaso, J.A. Hall, A.M. Hawald, D.W. Johnson, J.M. Randall, C.L. Roye, M.M. Ryan, and A.E. Stanton. 2003 Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands. (www.caleppc.org and www.swvma.org. California Exotic Pest Plant Council and Southwest Vegetation Management Association. 24 pp.

2.4. Allelopathic

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

Score 0

Documentation:

Describe effect on adjacent plants:

Oxeye daisy is not allelopathic (USDA, NRCS 2002).

Rational:

Sources of information:

USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). 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 3

Documentation:

Evidence of competitive ability:

Oxeye daisy is highly competitive for limiting factors (Rutledge and McLendon 1996).

Rational:

Sources of information:

Rutledge, C.R., and T. McLendon. 1996. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Department of Rangeland Ecosystem Science, Colorado State University. 97 pp. Northern Prairie Wildlife Research Center Home Page.
<http://www.npwrc.usgs.gov/resource/othrdata/Explant/explant.htm> (Version 15DEC98).

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

Documentation:

Describe grow form:

Oxeye daisy forms dense colonies up to 2 feet tall (Hultén 1968, Royer and Dickinson 1999, Whitson et al. 2000).

Rational:

Sources of information:

Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 p.
Royer, F. and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.
Whitson, T. D., L. C. Burrill, S. A. Dewey, D. W. Cudney, B. E. Nelson, R. D. Lee, R. Parker. 2000. Weeds of the West. The Western Society of Weed Science in cooperation with the Western United States Land Grant Universities, Cooperative Extension Services. University of Wyoming. Laramie, Wyoming. 630 pp.

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

Documentation:

Describe germination requirements:

Studies indicate that 90 to 95% of germination occurs at 68° F. Seedling germination is greater under increased moisture and is inhibited by continuous darkness. Dense groundcover can prevent establishment. Chilling and drought appear to have no effect on germination rates (Howarth and Welliams 1968).

Rational:

Sources of information:

Howarth, S.E. and J.T. Welliams. 1968. Biological flora of the British Isles. *Chrysanthemum Leucanthemum* L. *Journal of Ecology* 56:585-595.

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

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

Score

Documentation:

Species:
 A number of *Leucanthemum* species has been introduced into United States. Non of them listed as a weed (USDA, NRCS 2002).
 Sources of information:
 USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

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

0

Documentation:
 Describe type of habitat:
 Oxeye daisy is common on pastures, waste areas, meadows, and roadsides (Hultén 1968, Welsh 1974).
 Rational:
 Sources of information:
 Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 p.
 Welsh, S.L. 1974. Anderson's flora of Alaska and adjacent parts of Canada. Brigham University Press. 724 pp.

Total Possible

25

 Total

15

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:
 Oxeye daisy was introduced to North America as an ornamental and it is currently used and often sold commercially. Oxeye daisy is also a serious weed of 13 crops in 40 countries (Warner et al. 2003, Noxious Weed Control 2005).
 Rational:
 Flowers are showy, making the plant a popular ornamental species.
 Sources of information:
 Warner, P.J., C.C. Bossard, M.L. Brooks, J.M. DiTomaso, J.A. Hall, A.M. Hawald, D.W. Johnson, J.M. Randall, C.L. Roye, M.M. Ryan, and A.E. Stanton. 2003 Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands. (www.caleppc.org and www.swvma.org. California Exotic Pest Plant Council and Southwest Vegetation Management Association. 24 pp.
 Noxious Weed Control Board. Washington State. 2005.
<http://www.nwcb.wa.gov/INDEX.htm>

3.2. Known level of 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

Documentation:

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

Oxeye daisy readily spreads into variety of plant communities in California, including prairie, scrub, wet meadows, riparian forests, and open-canopy forests (Warner et al. 2003). In is also having a little impact on processes of natural communities in Rocky Mountain National Park, Colorado (Rutledge and McLendon 1996).

Sources of information:

Rutledge, C.R. and T. McLendon. 1996. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Department of Rangeland Ecosystem Science. Colorado State University.

Warner, P.J., C.C. Bossard, M.L. Brooks, J.M. DiTomaso, J.A. Hall, A.M. Hawald, D.W. Johnson, J.M. Randall, C.L. Roye, M.M. Ryan, and A.E. Stanton. 2003. Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands. (www.caleppc.org and www.swvma.org. California Exotic Pest Plant Council and Southwest Vegetation Management Association. 24 pp.

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

Documentation:

Identify type of disturbance:

Oxeye daisy is a weed of disturbed areas. It is requires disturbance for establishment and persistence (Densmore et al. 2001).

Rational:

Sources of information:

Densmore, R. V., P. C. McKee, C. Roland. 2001. Exotic plants in Alaskan National Park Units. Report on file with the National Park Service – Alaska Region, Anchorage, Alaska. 143 pp.

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

Documentation:

Describe distribution:

Oxeye daisy is native to Europe (Mediterranean to Scandinavia), and Siberia. Populations have been established in Eastern Asia, Iceland, Greenland, North and South America, Hawaii, 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.

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 state or Canadian province 4
- 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:

Oxeye daisy is noxious in Colorado, Indiana, Kentucky, Minnesota (Secondary Noxious Weed), Montana (Cat. 1), Ohio (Cat.1), Washington (Class B), and Wyoming. In the U.S. it is found in every state. Declared as noxious weed in Canada (Alberta, British Colombia, Manitoba, and Quebec) (Invaders Database System 2003, Royer and Dickinson 1999, USDA, NRCS 2002).

Rational:

Sources of information:

Invaders Database System. The University of Montana. 2003. Montana Noxious Weed Trust Fund. Department of Agriculture. <http://invader.dbs.umt.edu/>
 Royer, F. and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.
 USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

Total Possible

25

Total

18

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:

Seeds of oxeye daisy may survive extended periods in the soil. Bossard et al. (2000) suggest that most oxeye daisy seeds remain viable for twenty years in the soil. Toole (1946) determine the viability of oxeye daisy seeds as 39 years. Chippindale and Milton (1934) found 8-, 22-, 24-, 50-, and 68-years old seeds in the soil beneath pastures.

Rational:

Sources of information:

Bossard, C.C., J.M. Randal, M.C. Hoshovsky. 2000. Invasive plants of California’s wildlands. University of California Press. 360 pp.
 Chippindale, H.G. and W.E.J. Milton. 1934. On the viable seeds present in the soil beneath pastures. The Journal of Ecology 22(2): 508-531.
 Toole, E.H. 1946. Final result of the Duvel buried seed experiment. Journal of Agricultural Research 72: 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:

According to PLANTS Database (USDA, NRCS 2002), oxeye daisy has no resprout ability. However, Densmore et al. (2001) report that it sprouts from roots and stumps.

Rational:

Sources of information:

Densmore, R. V., P. C. McKee, C. Roland. 2001. Exotic plants in Alaskan National Park Units. Report on file with the National Park Service – Alaska Region, Anchorage, Alaska. 143 pp.

USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

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

3

Documentation:

Identify types of control methods and time-term required:

If infestation is small one or two chemical or mechanical treatments required.

Eradication of a large, well established population can be difficult because of abundant seed production and ability of rhizomes to resprout (Densmore et al. 2001, Warner et al. 2003).

Rational:

Sources of information:

Densmore, R. V., P. C. McKee, C. Roland. 2001. Exotic plants in Alaskan National Park Units. Report on file with the National Park Service – Alaska Region, Anchorage, Alaska. 143 pp.

Warner, P.J., C.C. Bossard, M.L. Brooks, J.M. DiTomaso, J.A. Hall, A.M. Hawald, D.W. Johnson, J.M. Randall, C.L. Roye, M.M. Ryan, and A.E. Stanton. 2003. Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands. (www.caleppc.org and www.swvma.org). California Exotic Pest Plant Council and Southwest Vegetation Management Association. 24 pp.

Total Possible

10

Total

8

Total for 4 sections Possible

100

Total for 4 sections

61

References:

Beck, K.G. Oxeye Daisy biology and management. Colorado State University.

Bossard, C.C., J.M. Randal, M.C. Hoshovsky. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp.

- Chippindale, H.G. and W.E.J. Milton. 1934. On the viable seeds present in the soil beneath pastures. *The Journal of Ecology* 22(2): 508-531.
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- Furbish, C.E. 2001. Exotic plant survey of the Chilkoot Trail Unit, Klondike Gold Rush National Historical Park. Natural Resources Management Program. 49 pp.
- Hultén, E. 1968. *Flora of Alaska and Neighboring Territories*. Stanford University Press, Stanford, CA. 1008 p.
- Howarth, S.E. and J.T. Williams. 1968. Biological flora of the British Isles. *Chrysanthemum Leucanthemum* L. *Journal of Ecology* 56:585-595.
- Invaders Database System. The University of Montana. 2003. Montana Noxious Weed Trust Fund. Department of Agriculture. <http://invader.dbs.umt.edu/>
- Noxious Weed Control Board. Washington State. <http://www.nwcb.wa.gov/INDEX.htm>
- Royer, F. and R. Dickinson. 1999. *Weeds of the Northern U.S. and Canada*. The University of Alberta press. 434 pp.
- Rutledge, C.R., and T. McLendon. 1996. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Department of Rangeland Ecosystem Science, Colorado State University. 97 pp. Northern Prairie Wildlife Research Center Home Page. <http://www.npwrc.usgs.gov/resource/othrdata/Explant/explant.htm> (Version 15DEC98).
- Stevens, O.A. 1932. The number and weight of seeds produced by weeds. *American Journal of Botany* 19(9): 784-794.
- Toole, E.H. 1946. Final result of the Duvel buried seed experiment. *Journal of Agricultural Research* 72: 201-210.
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