WEED RISK ASSESSMENT FORM

Botanical name: *Senecio jacobaea* L.

Common name: ragwort, stinking willie, tansy ragwort.

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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	

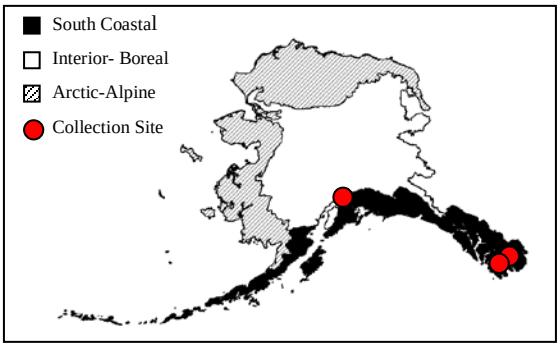
B.	**Invasiveness Ranking**	Total (Total Answered*) Possible	Total
1	Ecological impact	40 (40)	20
2	Biological characteristic and dispersal ability	25 (25)	15
3	Ecological amplitude and distribution	25 (25)	20
4	Feasibility of control	10 (10)	8
	Outcome score	100 (100)[b]	63 [a]
	Relative maximum score†		0.63

* 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: Tansy ragwort has been collected in Anchorage, Ketchikan (Weeds of Alaska Database 2004), and Prince of Wales Island (M. Shephard – pers. com.).
Sources of information:
Shephard, M. , Vegetation Ecologist, USDA, Forest Service, Forest Health Protection, State and Private Forestry, 3301 C Street, Suite 202, Anchorage, Alaska 99503 Division. Tel: (907) 743-9454 - Pers. comm.
Weeds of Alaska Database. 2004. AKEPIC Mapping Project Inventory Field Data. Alaska Natural Heritage Program, University of Alaska – US Forest Service – National Park Service. Available: http://akweeds.uaa.alaska.edu/

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

Yes 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: Range of the species includes Kirov, and Perm in Russia, and Anchorage, Alaska, which have 66%, 63%, and 61% climatic match with Nome, respectively. Therefore it is likely to establish in the Arctic-Alpine ecoregion.
Sources of information: CLIMEX for Windows, Version 1.1a. 1999. CISRO Publishing, Australia.
Gubanov, I.A., K.B. Kiseleva, B.C. Novikov, B.N. Tihomirov. 1995. Flora of vascular plants of Central European Russia. Moscow. Argus. 558 pp.

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 3

Documentation:
Identify ecosystem processes impacted:
As a pioneer of disturbed sites it is likely hinder the colonization by the native species. Additionally, as a strong competitor (Harris 2000) it likely reduces the availability of resources for co-occurring native species.
Rational:

Sources of information:
Harris, S.A. 2000. *Senecio jacobaea* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 291-295.

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 5

Documentation:
Identify type of impact or alteration:
In Southeast Alaska tansy ragwort establishes in existing herbaceous layer increasing its density and outcompeting other species (J. Conn – pers. com., T. Heutte –pers. com.).
Rational:

Sources of information:
Conn, J. Weed Scientist, USDA Agricultural Research Service PO Box 757200 Fairbanks, Alaska 99775 tel: (907) 474-7652; fax (907) 474-6184. – Pers. com.
Heutte, Thomas. USDA Forest Service State & Private Forestry. Forest Health Protection. 2770 Sherwood Ln Juneau Ak 99801. Tel: (907) 586-8811 x 283. Pers. obs.

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:
Tansy ragwort may out-compete native plants, reducing number of individuals in native species (Harris 2000).
Rational:

Sources of information:
Harris, S.A. 2000. *Senecio jacobaea* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 291-295.

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:
Tansy ragwort is highly toxic animals and human (CUPPID 2004, Harris 2000). Large

numbers of pollinating insects visit its flowers. More than sixty different consumers of tansy ragwort are recorded (Cameron 1935). Hybridization with other species of *Senecio* has been recorded from Britain (Harper and Wood 1957).
Rational:

Sources of information:
Cameron, E. 1935. A study of the natural control of ragwort (*Senecio jacobaea* L.). Journal of Ecology, 23: 265-322.
CUPPID - Cornel University: Poisonous Plants Informational Database. 2004. Available: http://www.ansci.cornell.edu
Harris, S.A. 2000. *Senecio jacobaea* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 291-295.
Harper, J.L. and W.A. Wood. 1957. Biological flora of the British Isles: *Senecio jacobaea* L. Journal of Ecology. 45: 617-637.

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

Score 3

Documentation:
Describe key reproductive characteristics (including seeds per plant):
Ragwort can regenerate by both seed and vegetatively. Cameron (1935) reported 4,760 to 174,230 seeds per plant from a range of habitats. Chancellor (Harper and Wood 1957) found a range of 7,000 to 20,000. In study of van der Meijden and van der Waals-kooi (1979) production varied between 1,000 and 30,000 achenes per plant. Plants are also capable of regeneration from pieces of rootstock (Harris 2000, Macdonald and Russo 1989).
Rational:

Sources of information:
Cameron, E. 1935. A study of the natural control of ragwort (*Senecio jacobaea* L.). Journal of Ecology, 23: 265-322.
Harris, S.A. 2000. *Senecio jacobaea* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 291-295.
Harper, J.L. and W.A. Wood. 1957. Biological flora of the British Isles: *Senecio jacobaea* L. Journal of Ecology. 45: 617-637.
Macdonald, C. and M.J. Russo. 1989. Element Stewardship Abstract for *Senecio jacobaea*. The Nature Conservancy. Arlington, VA.
Meijden, E. van der and R.R. van der Waals-kooi. 1979. The population ecology of *Senecio jacobaea* in the Netherlands sand dune system. I. Reproductive strategy and the biennial habit. Journal of Ecology. 67: 131-154.

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	3

pappus, hooked fruit-coats, etc.)

U. Unknown

Score 3

Documentation:

Identify dispersal mechanisms:

Ragwort achenes are tipped by hair-like plumes and able to travel by wind large distances (Harris 2000, Meijden van der and van der Waals-kooi 1979). However, studies have found that 60% of the total seed shed landed within 4.6 m of the base of the plants, an additional 39% landed between 4.6 and 9 m from the plant (Harris 2000, Macdonald and Russo 1989). Dispersal is also by water, animals, and birds. Achenes eaten by sheep pass through the digestive system undamaged (Green 1937, Harper and Wood 1957).

Rational:

Sources of information:

Green, H.E. 1937. Dispersal of *Senecio jacobaea*. Journal of Ecology. 25:569.

Harris, S.A. 2000. *Senecio jacobaea* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 291-295.

Harper, J.L. and W.A. Wood. 1957. Biological flora of the British Isles: *Senecio jacobaea* L. Journal of Ecology. 45: 617-637.

Macdonald, C. and M.J. Russo. 1989. Element Stewardship Abstract for *Senecio jacobaea*. The Nature Conservancy. Arlington, VA.

Meijden, E. van der and R.R. van der Waals-kooi. 1979. The population ecology of *Senecio jacobaea* in the Netherlands sand dune system. I. Reproductive strategy and the biennial habit. Journal of Ecology. 67: 131-154.

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:

Tansy ragwort is often spread in contaminated hay, grain seeds, and top soil (Harris 2000, USDA, ARS 2004). The plant can be also transported in mud or soil adhering to vehicles (Harris 2000).

Rational:

Sources of information:

Harris, S.A. 2000. *Senecio jacobaea* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 291-295.

Hodkinson, D., K. Thompson. 1997. Plant dispersal: the role of man. Journal of Applied Ecology, 34: 1484-1496.

USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/var/apache/cgi-bin/npgs/html/taxon.pl?2017 (04 March 2004)

2.4. Allelopathic

A. No 0

B. Yes 2

U. Unknown

Score 0

Documentation:
Describe effect on adjacent plants:
Judging from amount of literature, there is no allelopathy potential.
Rational:

Sources of information:

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 2

Documentation:
Evidence of competitive ability:
This plant easily out competes native grasses and forbs (Harris 2000)
Rational:

Sources of information:
Harris, S.A. 2000. *Senecio jacobaea* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 291-295.

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 0

Documentation:
Describe grow form:
Tansy ragwort can grow up to 6 feet tall but it does not have a smothering growth habit (Whitson 2000).
Rational:

Sources of information:
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 1

Documentation:
Describe germination requirements:
Germination and establishment is much higher on the bare soils. Light is required for germination (Cameron 1935, Harper and Wood 1957, Meijden van der and van der Waals-kooi 1979). In Southeast Alaska it has been observed germinating and established in vegetative stand (T. Heutte – pers. obs.).
Rational:

Sources of information:
Cameron, E. 1935. A study of the natural control of ragwort (*Senecio jacobaea* L.). Journal of Ecology, 23: 265-322.
Harper, J.L. and W.A. Wood. 1957. Biological flora of the British Isles: *Senecio jacobaea* L. Journal of Ecology. 45: 617-637.
Meijden, E. van der and R.R. van der Waals-kooi. 1979. The population ecology of *Senecio jacobaea* in the Netherlands sand dune system. I. Reproductive strategy and the biennial habit. Journal of Ecology. 67: 131-154.
Heutte, Thomas. USDA Forest Service State & Private Forestry. Forest Health Protection. 2770 Sherwood Ln Juneau Ak 99801. Tel: (907) 586-8811 x 283. Pers. obs.

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

A.	No	0
B.	Yes	3
U.	Unknown	

Score 3

Documentation:
Species:
Senecio madagascariensis Poir., *S. riddellii* Torr. & Gray, *S. squalidus* L., *S. vulgaris* L. (USDA 2002, Whitson et al. 2000).
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.
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.

2.9. 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:
Tansy ragwort is commonly found in pastures, forest clearcuts, overgrazed pastures, and along roadsides. The species occupies natural communities such as sand dunes and beech woodlands (Harris 2000, Harper and Wood 1957).
Rational:

Sources of information:
Harris, S.A. 2000. *Senecio jacobaea* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 291-295.
Harper, J.L. and W.A. Wood. 1957. Biological flora of the British Isles: *Senecio jacobaea* L. Journal of Ecology. 45: 617-637.

Total Possible 23
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:

Tansy ragwort is a weed of pastures and grasslands (Cameron 1935, Harper and Wood 1957).

Rational:

Sources of information:

Cameron, E. 1935. A study of the natural control of ragwort (*Senecio jacobaea* L.). Journal of Ecology, 23: 265-322.

Harper, J.L. and W.A. Wood. 1957. Biological flora of the British Isles: *Senecio jacobaea* L. Journal of Ecology. 45: 617-637.

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 3

Documentation:

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

Tansy ragwort is known to reduce the number of individuals in native species on sand dunes and beech woodlands (Harris 2000).

Sources of information:

Harris, S.A. 2000. *Senecio jacobaea* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 291-295.

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 3

Documentation:

Identify type of disturbance:

Ragwort needs disturbance to become established. Disturbance of turf by moles, gophers, ants, or rabbits may allow it to enter a previously closed community. Disturbances such as plowing, mowing, or trampling stimulate regeneration from the root buds and can intensify infestations (Cameron 1935, Harris 2000, Harper and Wood 1957, van der Meijden and van der Waals-kooi 1979). Sand drift is also a process creating favorable conditions for ragwort (van der Meijden and van der Waals-kooi 1979).

Rational:

Sources of information:

Cameron, E. 1935. A study of the natural control of ragwort (*Senecio jacobaea* L.). Journal of Ecology, 23: 265-322.

Harris, S.A. 2000. *Senecio jacobaea* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 291-295.

Harper, J.L. and W.A. Wood. 1957. Biological flora of the British Isles: *Senecio*

jacobaea L. Journal of Ecology. 45: 617-637.
Meijden, E. van der and R.R. van der Waals-kooi. 1979. The population ecology of *Senecio jacobaea* in the Netherlands sand dune system. I. Reproductive strategy and the biennial habit. Journal of Ecology. 67: 131-154.

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 5

Documentation:
Describe distribution:
Tansy ragwort is native to Europe (including northern Scandinavia) and western Asia and has become a serious rangeland pest in New Zealand, Tasmania, Australia, South Africa, and North and South America (Harris 2000).
Rational:

Sources of information:
Harris, S.A. 2000. *Senecio jacobaea* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 291-295.

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:
Tansy ragwort infests millions of acres of range and pasture land in the Pacific Northwest (Harris 2000). It is listed as Noxious weed in Arizona, California, Colorado, Idaho, Montana, Oregon, Washington, British Columbia, and Nova Scotia (Invaders Database System 2003).
Rational:

Sources of information:
Harris, S.A. 2000. *Senecio jacobaea* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 291-295.
Invaders Database System. The University of Montana. 2003. Montana Noxious Weed Trust Fund. Department of Agriculture. http://invader.dbs.umt.edu/ [March 1, 2004].

Total Possible 25
Total 20

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 2

Documentation:
Identify longevity of seed bank:
Seeds stored at the field temperature more than 3 years maintained a high capacity for germination. In another study, the large-scale germination was obtained from achenes 4 years old or more (Meijden van der and van der Waals-kooi 1979).
Rational:

Sources of information:
Meijden, E. van der and R.R. van der Waals-kooi. 1979. The population ecology of *Senecio jacobaea* in the Netherlands sand dune system. I. Reproductive strategy and the biennial habit. Journal of Ecology. 67: 131-154.

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:
Plants regenerate readily from root fragment after cutting or plowing (Cameron 1935, Harris 2000, Harper and Wood 1957, Macdonald and Russo 1989).
Rational:

Sources of information:
Cameron, E. 1935. A study of the natural control of ragwort (*Senecio jacobaea* L.). Journal of Ecology, 23: 265-322.
Harris, S.A. 2000. *Senecio jacobaea* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 291-295.
Harper, J.L. and W.A. Wood. 1957. Biological flora of the British Isles: *Senecio jacobaea* L. Journal of Ecology. 45: 617-637.
Macdonald, C. and M.J. Russo. 1989. Element Stewardship Abstract for *Senecio jacobaea.* The Nature Conservancy. Arlington, VA.

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 4

Documentation:
Identify types of control methods and time-term required:
Hand pulling has been the most common method of control in the early stages of infestation. Plowing, mowing, and burning might intensify local infestation. Sodium chlorate has been used in New Zealand but may seriously damage other plants in community. High cost of this chemical prevents its widespread use. Other herbicides have not been effective in controlling this plant. Biological controls have proven to be effective for long-term control in California (Harris 2000, Harper and Wood 1957, Macdonald and Russo 1989).
Rational:

Sources of information:
Harris, S.A. 2000. *Senecio jacobaea* L. In: Invasive plants of California's wildlands.

Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 291-295.
Harper, J.L. and W.A. Wood. 1957. Biological flora of the British Isles: *Senecio jacobaea* L. Journal of Ecology. 45: 617-637.
Macdonald, C. and M.J. Russo. 1989. Element Stewardship Abstract for *Senecio jacobaea.* The Nature Conservancy. Arlington, VA.

Total Possible	10
Total	8

Total for 4 sections Possible	100
Total for 4 sections	63

References:

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