WEED RISK ASSESSMENT FORM

Botanical name:	*Rubus discolor* Weihe & Nees
Common name:	Himalayan blackberry

Assessors:	Irina Lapina Botanist, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska 99501 tel: (907) 257-2710; fax (907) 257-2789	Matthew L. Carlson, Ph.D. Assistant Professor, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska 99501 tel: (907) 257-2790; fax (907) 257-2789
Reviewers:	Jeff Conn, Ph.D. Weed Scientist, USDA Agricultural Research Service PO Box 757200 Fairbanks, Alaska 99775 tel: (907) 474-7652; fax (907) 474-6184	Jeff Heys Exotic Plant Management Program Coordinator, National Park Service, Alaska Region - Biological Resources Team, 240 W. 5th Ave, #114, Anchorage, AK 99501 tel: (907)644-3451, fax: 644-3809
	Roseann Densmore, Ph.D. Research Ecologist, US Geological Survey, Alaska Biological Science Center, 1101 East Tudor Road Anchorage, AK 99503 tel: (907) 786-3916, fax (907) 786-3636	Julie Riley Horticulture Agent, UAF Cooperative Extension Service 2221 E. Northern Lights Blvd. #118 Anchorage, AK 99508-4143 tel: (907) 786-6306
	Jamie M. Snyder UAF Cooperative Extension Service 2221 E. Northern Lights Blvd. #118 Anchorage, AK 99508-4143 tel: (907) 786-6310 alt. tel: (907) 743-9448	

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		No
3	Arctic-Alpine		No

B.	Invasiveness Ranking	Total (Total Answered*) Possible	Total
1	Ecological impact	40 (40)	38
2	Biological characteristic and dispersal ability	25 (25)	18
3	Ecological amplitude and distribution	25 (25)	12
4	Feasibility of control	10 (10)	9
	Outcome score	100 (100)[b]	77 [a]
	Relative maximum score†		0.77

* 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	
	Interior-Boreal	
	Arctic-Alpine	
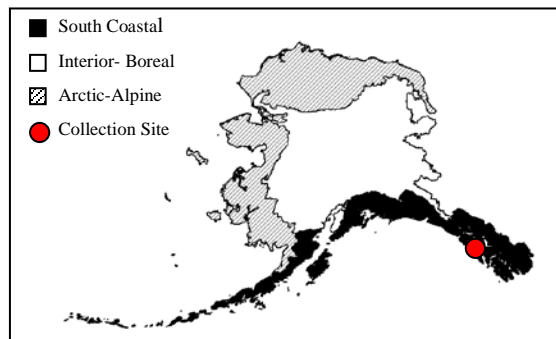
■ South Coastal
□ Interior- Boreal
▨ Arctic-Alpine
● Collection Site

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   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   No

        c. Nome (Arctic-Alpine)?

               Yes – *record locations and similarity; proceed to Section B. Invasiveness Ranking*
No   No

               – *If "No" is answered for all regions, reject species from consideration*

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   **8**

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 10

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 10

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 10

Total Possible 40
Total 38

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

4

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 3

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 2

Hitchcock, C.L. and A. Cronquist. 1961. Vascular plants of the Pacific Northwest. Part 3: Saxifragaceae to Ericaceae. Seattle and London: University of Washington Press 614 p.

2.4. Allelopathic

A.	No	0
B.	Yes	2
U.	Unknown	

Score 0

Documentation:
Describe effect on adjacent plants:
There is no record concerning allelophathy.
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 3

Documentation:
Evidence of competitive ability:
Himalayan blackberry is a very strong competitor. Thickets grow quickly and produce a dense, shading canopy that limits the growth of other plants (Hoshovsky 2000).
Rational:

Sources of information:
Hoshovsky, M.C. 2000. *Rubus discolor* Weihe & Nees. In: Bossard CC, Randall JM and Hoshovsky MC, editors. Invasive plants of California's wildlands. Berkeley, Los Angeles, London: University of California Press. p 277-281.

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 2

Documentation:
Describe grow form:
Himalayan blackberry forms very large impenetrable thickets (Hoshovsky 2000, Tirmenstein 1989).
Rational:

Sources of information:
Hoshovsky, M.C. 2000. *Rubus discolor* Weihe & Nees. In: Bossard CC, Randall JM and Hoshovsky MC, editors. Invasive plants of California's wildlands. Berkeley, Los Angeles, London: University of California Press. p 277-281.
Tirmenstein, D. 1989. *Rubus discolor*. In: Fire Effects Information System [online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ via the INTERNET. Accessed 2005 Feb 07.

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 [0]

> Documentation:
> Describe germination requirements:
> Seedlings require open habitats or eroded soils for establishment (Hoshovsky 2000).
> Rational:
> Seedlings are intolerants of shading and are easily surpassed by the rapidly growing vegetative daughter plants (Hoshovsky 2000).
> Sources of information:
> Hoshovsky, M.C. 2000. *Rubus discolor* Weihe & Nees. In: Bossard CC, Randall JM and Hoshovsky MC, editors. Invasive plants of California's wildlands. Berkeley, Los Angeles, London: University of California Press. p 277-281.

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

A.	No	0
B.	Yes	3
U.	Unknown	

Score [3]

> Documentation:
> Species:
> *Rubus argutus* Link, *R. ellipticus* Sm., *R glaucus* Benth., *R niveus* Thunb. are considered invasive species in Hawaii (Plans of Hawaii 2003).
> Sources of information:
> Plants of Hawaii [Internet]. USGS, National Park Service. 2003 March 12; Available from: http://www.hear.org/starr/hiplants/index.html

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 [2]

> Documentation:
> Describe type of habitat:
> Himalayan blackberry is common in wastelands, pastures, and clearcuts. It grows along roadsides, creek gullies, river flats, and fence lines. It is common in riparian areas, where it withstands periodic inundation by fresh or brackish water (Ertter 1993, Hoshovsky 2000).
> Rational:
>
> Sources of information:
> Ertter, B. 1993. *Rubus*. In: Hickman JC, editor. The Jepson manual. Higher plants of California. Berlekey, Los Angeles, London: University of California Press. p 974-975.
> Hoshovsky, M.C. 2000. *Rubus discolor* Weihe & Nees. In: Bossard CC, Randall JM and Hoshovsky MC, editors. Invasive plants of California's wildlands. Berkeley, Los Angeles, London: University of California Press. p 277-281.

Total Possible	25
Total	18

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

<div style="text-align:right">Score | 4</div>

Documentation:
Identify reason for selection, or evidence of weedy history:
Himalayan blackberry is widely cultivated. It was probably introduced to North America in 1885 as a cultivated crop (Hoshovsky 2000, Tirmenstein 1989).
Rational:

Sources of information:
Hoshovsky, M.C. 2000. *Rubus discolor* Weihe & Nees. In: Bossard CC, Randall JM and Hoshovsky MC, editors. Invasive plants of California's wildlands. Berkeley, Los Angeles, London: University of California Press. p 277-281.
Tirmenstein, D. 1989. *Rubus discolor*. In: Fire Effects Information System [online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ via the INTERNET. Accessed 2005 Feb 07.

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	

<div style="text-align:right">Score | 1</div>

Documentation:
Identify type of habitat and states or provinces where it occurs:
Himalayan blackberry is known to impact riparian woodlands and intertidal zones of central California (Hoshovsky 2000, Tirmenstein 1989). This species invades pastures and forest plantations un Victoria, Australia (Amor 1973). It can become dominant in clearcut coniferous forests in the Pacific Northwest (M. L. Carlson – pers. obs.)
Sources of information:
Amor, R.L. 1973. Ecology and control of blackberry (*Rubus fruticosus* L. Agg.) I. *Rubus* ssp. as weeds in Victoria. Weed Research 13: 218-223.
Carlson, M.L., Assistant Professor, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska. Tel: (907) 257-2790 – Pers. obs.
Hoshovsky, M.C. 2000. *Rubus discolor* Weihe & Nees. In: Bossard CC, Randall JM and Hoshovsky MC, editors. Invasive plants of California's wildlands. Berkeley, Los Angeles, London: University of California Press. p 277-281.
Tirmenstein, D. 1989. *Rubus discolor*. In: Fire Effects Information System [online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ via the INTERNET. Accessed 2005 Feb 07.

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	

<div style="text-align:right">Score | 0</div>

Documentation:
Identify type of disturbance:
Himalayan blackberry colonizes disturbed areas. Seedlings require open habitats or

eroded soils for establishment (Hoshovsky 2000). Seeds from the seed bank can germinate in large numbers after disturbance (Tirmenstein 1989).
Rational:

Sources of information:
Hoshovsky, M.C. 2000. *Rubus discolor* Weihe & Nees. In: Bossard CC, Randall JM and Hoshovsky MC, editors. Invasive plants of California's wildlands. Berkeley, Los Angeles, London: University of California Press. p 277-281.
Tirmenstein, D. 1989. *Rubus discolor*. In: Fire Effects Information System [online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ via the INTERNET. Accessed 2005 Feb 07.

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 3

Documentation:
Describe distribution:
Himalayan blackberry is native to western Europe and northern Africa. It was naturalized in southwestern Asia, Australia, Polynesia, North and South America, South Africa, and New Zealand (USDA, ARS 2005).
Rational:

Sources of information:
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?300618 [January 28, 2005].

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 4

Documentation:
Identify states invaded:
Himalayan blackberry has become widely naturalized in the Northeast from Delaware to Virginia, and in the Pacific Northwest from northern California through southern British Columbia, and east to Idaho (Starr and Loope 2003, USDA 2002). *Rubus discolor* is considered a noxious weed in Oregon (Invaders Database System 2003, USDA 2002).
Rational:

Sources of information:
Starr, F., K. Starr, and L. Loope. 2003. *Rubus discolor* Himalayan blackberry Rosaceae. Plants of Hawaii. Available: http://www.hear.org/starr/hiplants/index.html via the INTERNET. Accessed 2003 Feb 07.
Invaders Database System. The University of Montana. 2003. Montana Noxious Weed Trust Fund. Department of Agriculture. http://invader.dbs.umt.edu/
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	12

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 remain viable in the soil for several years (Hoshovsky 2000).
Rational:

Sources of information:
Hoshovsky, M.C. 2000. *Rubus discolor* Weihe & Nees. In: Bossard CC, Randall JM
and Hoshovsky MC, editors. Invasive plants of California's wildlands.
Berkeley, Los Angeles, London: University of California Press. p 277-281.

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 | 3

Documentation:
Describe vegetative response:
This shrub resprouts from roots and canes (Richardson 1975, Tirmenstein 1989).
Rational:

Sources of information:
Richardson, R.G. 1975. Regeneration of blackberry (*Rubus procerus* P. J. Muell.) from
root segments. Weed Research 15: 335-337.
Tirmenstein, D. 1989. *Rubus discolor*. In: Fire Effects Information System [online].
U.S. Department of Agriculture, Forest Service, Rocky Mountain Research
Station, Fire Sciences Laboratory (Producer). Available:
http://www.fs.fed.us/database/feis/ via the INTERNET. Accessed 2005 Feb
07.

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:
Himalayan blackberry is a difficult species to control because of its extensive vegetative
reproduction and because it often grows in very sensitive wetland habitats. Mechanical

removal or burning may by the most effective ways of removing mature plants. Additional treatments with some herbicides can promote vegetative growth from lateral roots. This species is shade-intolerant, so reestablishment may be prevented by planting fast-growing shrubs or trees. Resprouting is problematic, and many years of follow-up efforts are necessary for control. The introduction of herbivorous insects and fungi to control Himalayan blackberry is not supported by USDA because of the risk posed to commercially important *Rubus* species (Hoshovsky 1989, Hoshovsky 2000, Starr 2003).

Rational:

Sources of information:
Hoshovsky, M.C. 1989. Element stewardship abstract for *Rubus discolor*, (*Rubus procerus*) Himalayan blackberry. Arlington, Virginia: The Nature Conservancy. Available: http://tncweeds.ucdavis.edu/esadocs/rubudisc.html via the INTERNET. Accessed 2005 Feb 07.
Hoshovsky, M.C. 2000. *Rubus discolor* Weihe & Nees. In: Bossard CC, Randall JM and Hoshovsky MC, editors. Invasive plants of California's wildlands. Berkeley, Los Angeles, London: University of California Press. p 277-281.
Starr, F., K. Starr, and L. Loope. 2003. *Rubus discolor* Himalayan blackberry Rosaceae. Plants of Hawaii. Available: http://www.hear.org/starr/hiplants/index.html via the INTERNET. Accessed 2003 Feb 07.

Total Possible	10
Total	9

Total for 4 sections Possible	100
Total for 4 sections	77

References:

AK Weeds Database. 2004. Database of exotic vegetation collected in Alaska. University of Alaska, Alaska Natural Heritage Program – US Forest Service – National Park Service Database. Available: http://akweeds.uaa.alaska.edu/

Amor, R.L. 1973. Ecology and control of blackberry (*Rubus fruticosus* L. Agg.) I. *Rubus* ssp. as weeds in Victoria. Weed Research 13: 218-223.

Australia's Virtual Herbarium [INTERNET]. Melbourne: Royal Botanical Garden. 2005 Feb 09; Available from: http://www.rbg.vic.gov.au/cgi-bin/avhpublic/avh.cgi?session=1108009789507

Brunner, H., R.V. Harris, and R.L. Amor. 1975. A note on the dispersal of seeds on blackberry (*Rubus procerus* P.J. Muell.) by foxes and emus. Weed Research 16: 171-173.

Carlson, M. L., Assistant Professor, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska. Tel: (907) 257-2790 – Pers. obs.

CLIMEX for Windows, Version 1.1a. 1999. CISRO Publishing, Australia.

Ertter, B. 1993. *Rubus*. In: Hickman JC, editor. The Jepson manual. Higher plants of California. Berlekey, Los Angeles, London: University of California Press. p 974-975.

Hitchcock, C.L. and A. Cronquist. 1961. Vascular plants of the Pacific Northwest. Part 3: Saxifragaceae to Ericaceae. Seattle and London: University of Washington Press 614 p.

Hoshovsky, M.C. 1989. Element stewardship abstract for *Rubus discolor*, (*Rubus procerus*) Himalayan blackberry. Arlington, Virginia: The Nature Conservancy. Available: http://tncweeds.ucdavis.edu/esadocs/rubudisc.html via the INTERNET. Accessed 2005 Feb 07.

Hoshovsky, M.C. 2000. *Rubus discolor* Weihe & Nees. In: Bossard CC, Randall JM and Hoshovsky MC, editors. Invasive plants of California's wildlands. Berkeley, Los Angeles, London: University of California Press. p 277-281.

Invaders Database System. The University of Montana. 2003. Montana Noxious Weed Trust Fund. Department of Agriculture. http://invader.dbs.umt.edu/

Plants of Hawaii [Internet]. USGS, National Park Service. 2003 March 12; Available from: http://www.hear.org/starr/hiplants/index.html

Richardson, R.G. 1975. Regeneration of blackberry (*Rubus procerus* P. J. Muell.) from root segments. Weed Research 15: 335-337.

Starr, F., K. Starr, and L. Loope. 2003. *Rubus discolor* Himalayan blackberry Rosaceae. Plants of Hawaii. Available: http://www.hear.org/starr/hiplants/index.html via the INTERNET. Accessed 2003 Feb 07.

Tirmenstein, D. 1989. *Rubus discolor*. In: Fire Effects Information System [online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ via the INTERNET. Accessed 2005 Feb 07.

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.

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?300618 [January 28, 2005).

WRCC - Western Regional Climate Center 2001. Desert Research Institute. http://www.wrcc.dri.edu [16 April 2001].