

Part IV. Plant Assessment Form

For use with “Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands”
by the California Exotic Pest Plant Council and the Southwest Vegetation Management Association

Electronic version, February 28, 2003

Table 1. Species and Evaluator Information

Species name (Latin binomial):	Marrubium vulgare L.
Synonyms:	enter text here
Common names:	Horehound, white horehound
Evaluation date (mm/dd/yy):	06/10/04
Evaluator #1 Name/Title:	John J. Knapp/ Invasive Plant Program Manager
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Section below for list committee use—please leave blank

List committee members:	Joe DiTomaso, Alison Stanton, Joanna Clines, Cynthia Roye, Doug Johnson
Committee review date:	7/8/05
List date:	enter text here
Re-evaluation date(s):	enter text here

General comments on this assessment:

A larger problem on California islands.

Table 2. Criteria, Section, and Overall Scores

<u>1.1</u>	Impact on abiotic ecosystem processes	U	No Information
<u>1.2</u>	Impact on plant community	B	Other Pub. Mat'l
<u>1.3</u>	Impact on higher trophic levels	C	Other Pub. Mat'l
<u>1.4</u>	Impact on genetic integrity	D	Other Pub. Mat'l

“Impact”
 Enter four characters from Q1.1-1.4 below:
UBCD
 Use matrix determine the score; enter below:
C

<u>2.1</u>	Role of anthropogenic and natural disturbance	C 1	Other Pub. Mat'l
<u>2.2</u>	Local rate of spread with no management	B 2	Other Pub. Mat'l
<u>2.3</u>	Recent trend in total area infested within state	C 2	Other Pub. Mat'l
<u>2.4</u>	Innate reproductive potential <u>Wksht A</u>	A 3	Rev'd, Sci. Pub'n
<u>2.5</u>	Potential for human-caused dispersal	C 1	Other Pub. Mat'l
<u>2.6</u>	Potential for natural long-distance dispersal	C 1	Other Pub. Mat'l
<u>2.7</u>	Other regions invaded	C 1	Other Pub. Mat'l

“Invasiveness”
 For questions at left, recall that an A gets 3 points, a B gets 2, a C gets 1, and a D or U gets=0. Enter the sum total of all points for Q2.1-2.7 below:
10
 Use matrix to determine score and enter below:
C

“Plant Score”
 Using matrix, determine the Overall Score and Alert Status from the three section scores and enter them below:
Low
No Alert

<u>3.1</u>	Ecological amplitude/Range	A	Other Pub. Mat'l
<u>3.2</u>	Distribution/Peak frequency <u>Wksht C</u>	C	Observational

“Distribution”
 Use matrix determine the score; enter below:
B

Table 3. Documentation

<p>Question 1.1 Impact on abiotic ecosystem processes</p>	<p>U No Information back</p>
<p>Identify ecosystem processes impacted: enter text here</p>	
<p>Rationale: enter text here</p>	
<p>Sources of information: enter text here</p>	
<p>Question 1.2 Impact on plant community composition, structure, and interactions</p>	<p>B Other Pub. Mat'l back</p>
<p>Identify type of impact or alteration: <i>M. vulgare</i> is only browsed by livestock when no other forage material is present (2), which gives it a competitive advantage over surrounding species that are more edible (1). Expands range during drought conditions and outcompetes native vegetation most likely for water due to deep tap root in annual grasslands (3). High priority species of significance on the Channel Islands (4). In 1980 in Victoria, Australia, 6 million ha. of which 100,000 ha were dense, 1.5 million ha. were medium, and 4.4 million ha were scattered (5). Forms small to large dense patches greater than 75% cover on Catalina Island, excluding native vegetation and altering grassland structure (6). Not nearly as invasive on mainland California where it rarely forms dense patches. White horehound is sometimes an especially common weed in overgrazed areas. Plants thrive in areas where there is little competition with other vegetation.</p>	
<p>Rationale: enter text here</p>	
<p>Sources of information: (1) Baker, H.G. 1986. Patterns of plant invasion in North America. Pp. 44-57 in: Mooney, H.A. and J.A. Drake, eds. Ecology of biological invasions of North America and Hawaii. Ecological Studies Volume 58. New York: Springer-Verlag.</p> <p>(2) Whittet, J.N. 1968. Weeds: A volume in the Farmer's Handbook Series. 2nd edition. New South Wales Department of Agriculture, Australia.</p> <p>(3) Anonymous. 1988. Horehound (<i>Marrubium vulgare</i>). Tamar Valley Weed Strategy-www.weeds.asn.au. http://www.weeds.asn.au/weeds/txts/horehound.html.</p> <p>(4) Klinger, R.C. and D. VanVuren. 1999. Thirty years of research on California's Channel Islands: an overview and suggestions for the next 30 years. Pp. 323-329 in: Proceedings of the Fifth California Islands Symposium.</p> <p>(5) Lippai, A., P. Smith, T. Price, J. Weiss, and C. Lloyd. 1996. Effects of temperature and water potential on germination of horehound (<i>Marrubium vulgare</i>) seeds from two Australian localities. Weed Science 44: 91-99.</p> <p>(6) Knapp, J.J. 2003. Personal observation during field survey on Catalina Island, California. jknapp@catalinaconservancy.org.</p>	
<p>Question 1.3 Impact on higher trophic levels</p>	<p>C Other Pub. Mat'l back</p>
<p>Identify type of impact or alteration: No forage value for browsers and grazers (1,2). Livestock generally avoid consuming the bitter-tasting foliage.</p>	
<p>Rationale: enter text here</p>	

Sources of information: (1) Baker, H.G. 1986. Patterns of plant invasion in North America. Pp. 44-57 in: Mooney, H.A. and J.A. Drake, eds. Ecology of biological invasions of North America and Hawaii. Ecological Studies Volume 58. New York: Springer-Verlag.	
(2) Whittet, J.N. 1968. Weeds: A volume in the Farmer's Handbook Series. 2nd edition. New South Wales Department of Agriculture, Australia.	
Question 1.4 Impact on genetic integrity	D Other Pub. Mat'l back
Identify impacts: No hybridization is known to occur.	
Rationale: No native California taxa are in the genus Marrubium (1).	
Sources of information: (1) Hickman, J.C. (ed.). 1993. The Jepson manual of higher plants of California. P. 715. University of California Press, Berkeley.	
Question 2.1 Role of anthropogenic and natural disturbance in establishment	C Other Pub. Mat'l back
Describe role of disturbance: Roadsides (1,3), dry waste areas, gardens (1), natural pastures (2,3), conservation areas (3), and open areas (5,4). Dispersed and established in clean country (2), but mostly disturbed sites (5). Dirt piles, ground squirrel mounds, and soil around fallen island scrub oak (6).	
Rationale:	
Sources of information: (1) Whitson, T.D., ed. 2001. Weeds of the West. 9th edition. Western Society of Weed Science in cooperation with the Western United States Land Grant Universities Cooperative Extension Services.	
(2) Whittet, J.N. 1968. Weeds: A volume in the Farmer's Handbook Series. 2nd edition. New South Wales Department of Agriculture, Australia.	
(3) Cronquist, A. 1984. Intermountain flora: vascular plants of the intermountain west, USA. Volume 4. The New York Botanical Garden, Bronx. 573 pp.	
(5) Lippai, A., P. Smith, T. Price, J. Weiss, and C. Lloyd. 1996. Effects of temperature and water potential on germination of horehound (<i>Marrubium vulgare</i>) seeds from two Australian localities. <i>Weed Science</i> 44: 91-99.	
(4) Wilken, D. and Hannah, L. 1998. <i>Lactuca serriola</i> : Channel Islands National Park Service literature review. Unpublished.	
(6) Knapp, J.J. 2004. Personal observation from 2002-2004, construction areas containing piles of soil on Catalina Island, CA. jknapp@catalinaconservancy.org .	
Question 2.2 Local rate of spread with no management	B Other Pub. Mat'l back
Describe rate of spread: In Australia, rapid expansion occurs during drought years when it outcompetes native vegetation (1). On Catalina Island, one population was known in 1896 (3), and by 1923 it was considered common every where on the Island, and then in 2003, 2,921 populations were recorded (2). In other areas of California, it has not expanded and has remained static.	
Rationale: enter text here	

Sources of information: (1) Anonymous. 1988. Horehound (<i>Marrubium vulgare</i>). Tamar Valley Weed Strategy- www.weeds.asn.au. http://www.weeds.asn.au/weeds/txts/horehound.html .	
(2) Knapp, J.J. 2004. Catalina Invasive Plant Ranking Plan for the Catalina Island Conservancy. Unpublished.	
(3) Millspaugh, C.F. and Nuttall, L.W. 1923. Flora of Santa Catalina Island. P. 239. Field Museum of Natural History, Botany v.5. Chicago.	
Question 2.3 Recent trend in total area infested within state	C Other Pub. Mat'l back
Describe trend: Occurs on all Channel Islands (1,6,7) small to large populations dominated by <i>M. vulgare</i> (2). Hand-pulled in Solstice Canyon, Santa Monica Mountains (3). Tons of <i>M. vulgare</i> was removed in Big Sycamore Canyon (4). Occurs in the mouths of canyons on the side of coastal side of mountain ranges from Santa Barbara to San Diego (5). On Catalina Island, 18,272,200 ft ² (419 ac) are invaded (8). Appears relatively stable statewide.	
Rationale: enter text here	
Sources of information: (1) Stone, c.P., C.W. Smith, and J.T. Tunison, eds. 1992. Alien plant invasions in native ecosystems of Hawai'i: Management and research. University of Hawai'i Cooperative National Park Resources Unit, Honolulu, Hawai'i.	
(2) Chaney, S. and K. McEachern. 2000. Final report: Development and implementation of an alien plant control strategy for Channel Islands National Park. Ventura, California: Channel Islands National Park Field Station.	
(3) Perala, C. and D.A. Hoover. 1990. Hand-removal of exotics and planting of natives key to restoration of riparian forest understory (California). Restoration and Management Notes 8(2): 118.	
(4) Hoover, D.A. Date??? Control of the aliens: unnatural plant communities in the Santa Monica Mountains. Fremontia XXX.	
(5) Anonymous. 1989. Control of the aliens: unnatural plant communities in the Santa Monica Mountains. Fremontia 17(2): 22-24.	
(6) Klinger, R.C. and D. VanVuren. 1999. Thirty years of research on California's Channel Islands: an overview and suggestions for the next 30 years. Pp. 323-329 in: Proceedings of the Fifth California Islands Symposium.	
(7) Wilken, D. and Hannah, L. 1998. <i>Lactuca serriola</i> : Channel Islands National Park Service literature review. Unpublished.	
(8) Knapp, J.J. 2004. Catalina Invasive Plant Ranking Plan for the Catalina Island Conservancy. Unpublished.	
Question 2.4 Innate reproductive potential	A Rev'd, Sci. Pub'n back
Describe key reproductive characteristics: Perennial that grows best on alkaline soils (1). Prolific seeder, but is dependent on rainfall and water availability (2). Large seed bank with high germination rates (2). In California, flowers from April to October (3).	

Rationale: enter text here	
Sources of information: (1) Anonymous. 1988. Horehound (Marrubium vulgare). Tamar Valley Weed Strategy- www.weeds.asn.au . http://www.weeds.asn.au/weeds/txts/horehound.html .	
(2) Lippai, A., P. Smith, T. Price, J. Weiss, and C. Lloyd. 1996. Effects of temperature and water potential on germination of horehound (Marrubium vulgare) seeds from two Australian localities. <i>Weed Science</i> 44: 91-99.	
(3) Wilken, D. and Hannah, L. 1998. Marrubium vulgare: Channel Islands National Park Service literature review. Unpublished.	
Question 2.5 Potential for human-caused dispersal	C Other Pub. Mat'l back
Identify dispersal mechanisms: Planted for medicinal purposes in gardens (1), but this is uncommon. <i>M. vulgare</i> was one of the two most common seeds found in the hair shed by bison on Catalina Island, and seed had a rate of 85% viability (2). Dispersed on clothing (3). Movement of soil (4). Fruits disperse by clinging to the shoes and clothing of people, and vehicle tires, and with water, soil movement, mud, and human activities. Vast majority of seed fall directly to ground below parent plant.	
Rationale: enter text here	
Sources of information: (1) Baker, H.G. 1986. Patterns of plant invasion in North America. Pp. 44-57 in: Mooney, H.A. and J.A. Drake, eds. <i>Ecology of biological invasions of North America and Hawaii</i> . Ecological Studies Volume 58. New York: Springer-Verlag.	
(2) Constible, J.M., Sweitzer, R.A., Van Vuren, D.H., Schuyler, P.T. and Knapp, D.A. 2004. Differential dispersal of non-native plants by introduced bison in and island ecosystem. In press.	
(3) Anonymous. 1988. Horehound (Marrubium vulgare). Tamar Valley Weed Strategy- www.weeds.asn.au . http://www.weeds.asn.au/weeds/txts/horehound.html .	
(4) Knapp, J.J. 2004. Personal observation from 2002-2004, construction areas containing piles of soil on Catalina Island, CA. jknapp@catalinaconservancy.org .	
Question 2.6 Potential for natural long-distance dispersal	C Other Pub. Mat'l back
Identify dispersal mechanisms: Fruits are transported on the fur of animals (1). Animal fur (3,4) and water along drainage lines and creeks (3). Fruits disperse by clinging to the fur, feathers, and feet of animals, and with water. Seeds survive ingestion by horses. (5) Again, these are probably minor means of spread as most seed fall direct to soil surface.	
Rationale: Fruits are hooked (bur-like) (2).	
Sources of information: (1) Baker, H.G. 1986. Patterns of plant invasion in North America. Pp. 44-57 in: Mooney, H.A. and J.A. Drake, eds. <i>Ecology of biological invasions of North America and Hawaii</i> . Ecological Studies Volume 58. New York: Springer-Verlag.	
(2) Whitson, T.D., ed. 2001. <i>Weeds of the West</i> . 9th edition. Western Society of Weed Science in cooperation with the Western United States Land Grant Universities Cooperative Extension Services.	
(3) Anonymous. 1988. Horehound (Marrubium vulgare). Tamar Valley Weed Strategy- www.weeds.asn.au . http://www.weeds.asn.au/weeds/txts/horehound.html .	

<p>(4) Constible, J.M., Sweitzer, R.A., Van Vuren, D.H., Schuyler, P.T. and Knapp, D.A. 2004. Differential dispersal of non-native plants by introduced bison in and island ecosystem. In press.</p> <p>(5) DiTomaso and Healy. 2006. Weeds of California. UC DANR Publ. #3488.</p>	
<p>Question 2.7 Other regions invaded</p>	<p>C Other Pub. Mat'l back</p>
<p>Identify other regions: Southern Canada and continental United States (1,3). Declared a noxious weed in Australia and Tasmania (2,3), New Zealand, South Africa, and Hawaii (3).</p>	
<p>Rationale: enter text here</p>	
<p>Sources of information: (1) Baker, H.G. 1986. Patterns of plant invasion in North America. Pp. 44-57 in: Mooney, H.A. and J.A. Drake, eds. Ecology of biological invasions of North America and Hawaii. Ecological Studies Volume 58. New York: Springer-Verlag.</p> <p>(2) Anonymous. 1988. Horehound (<i>Marrubium vulgare</i>). Tamar Valley Weed Strategy-www.weeds.asn.au. http://www.weeds.asn.au/weeds/txts/horehound.html.</p> <p>(3) Wilken, D. and Hannah, L. 1998. <i>Lactuca serriola</i>: Channel Islands National Park Service literature review. Unpublished.</p>	
<p>Question 3.1 Ecological amplitude/Range</p>	<p>A Other Pub. Mat'l back</p>
<p>Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: First reported near San Francisco in 1870, and was considered naturalized in southern California by the late 19 century (4). First collected on Catalina Island in 1896 (5). In California, open, wet or dry often rocky places, from lowlands to middle and even upper elevation in the mountains up to 3300 meters (2). On Catalina Island, 18,272,200 ft² are infested by 2,921 populations, and the following is the percentage of habitats invaded: bare-<0.00%, beach-0.00%, coastal scrub-0.02%, coastal scrub/grassland-7.9%, grassland-1.3%, chaparral-0.02%, riparian-3.2%, and 591 populations in non-native communities (3). Pastures, especially those that are overgrazed, fields, roadsides, rangeland, disturbed natural areas, waste places, ditches, other disturbed places. Most often grows in dry places, but is considered a facultative wetland species (6).</p>	
<p>Rationale: enter text here</p>	
<p>Sources of information:</p> <p>(2) Cronquist, A. 1984. Intermountain flora: vascular plants of the intermountain west, USA. Volume 4. The New York Botanical Garden, Bronx. 573 pp.</p> <p>(3) Knapp, J.J. 2004. Catalina Invasive Plant Ranking Plan for the Catalina Island Conservancy. Unpublished.</p> <p>(4) Wilken, D. and Hannah, L. 1998. <i>Marrubium vulgare</i>: Channel Islands National Park Service literature review. Unpublished.</p> <p>(5) Millspaugh, C.F. and Nuttall, L.W. 1923. Flora of Santa Catalina Island. P. 239. Field Museum of Natural History, Botany v.5. Chicago.</p> <p>(6) DiTomaso and Healy. 2006. Weeds of California. UC DANR Publ. #3488.</p>	

Question 3.2 Distribution/Peak frequency

C Other Pub. Mat'l [back](#)

Describe distribution: See 3.1.

Rationale: enter text here

Sources of information: Knapp, observational.

DiTomaso, observational

Worksheet A[back](#)

Reaches reproductive maturity in 2 years or less	Yes: 1 pt
Dense infestations produce >1,000 viable seed per square meter	Yes: 2 pts
Populations of this species produce seeds every year.	Yes: 1 pt
Seed production sustained over 3 or more months within a population annually	Yes: 1 pt
Seeds remain viable in soil for three or more years	Yes: 2 pts
Viable seed produced with <i>both</i> self-pollination and cross-pollination	Unknown: 0 pts
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	No: 0 pt
Fragments easily and fragments can become established elsewhere	No: 0 pts
Resprouts readily when cut, grazed, or burned	No: 0 pt
	7 pts 1 unknown
	A (6+ pts)
Note any related traits: enter text here	

Worksheet C - California Ecological Types

[back](#)

(*sensu* Holland 1986)

Major Ecological Types	Minor Ecological Types	Code*
Marine Systems	marine systems	score
Freshwater and Estuarine Aquatic Systems	lakes, ponds, reservoirs	score
	rivers, streams, canals	score
	estuaries	score
Dunes	coastal	D. presen
	desert	score
	interior	score
Scrub and Chaparral	coastal bluff scrub	score
	coastal scrub	C. 5-20%
	Sonoran desert scrub	score
	Mojavean desert scrub (incl. Joshua tree woodland)	score
	Great Basin scrub	score
	chenopod scrub	score
	montane dwarf scrub	score
	Upper Sonoran subshrub scrub	score
	chaparral	D. presen
Grasslands, Vernal Pools, Meadows, and other Herb Communities	coastal prairie	C. 5-20%
	valley and foothill grassland	D. presen
	Great Basin grassland	score
	vernal pool	score
	meadow and seep	D. presen
	alkali playa	score
	pebble plain	score
Bog and Marsh	bog and fen	score
	marsh and swamp	score
Riparian and Bottomland	riparian forest	score
	riparian woodland	score
	riparian scrub (incl. desert washes)	D. presen
Woodland	cismontane woodland	D. presen
	piñon and juniper woodland	score
	Sonoran thorn woodland	score
Forest	broadleaved upland forest	score
	North Coast coniferous forest	score
	closed cone coniferous forest	score
	lower montane coniferous forest	score
	upper montane coniferous forest	score
	subalpine coniferous forest	score
Alpine Habitats	alpine boulder and rock field	score
	alpine dwarf scrub	score

* A. means >50% of type occurrences are invaded; B means >20% to 50%; C. means >5% to 20%; D. means present but ≤5%; U. means unknown (unable to estimate percentage of occurrences invaded).