Keywords: High Risk, Temperate, Herbaceous, Naturalized, Weedy Genus, Full Sun

***Family:*** ***Plantaginaceae***

***Taxon:*** ***Linaria purpurea***

***Synonym:*** *NA* ***Common Name:*** purple toadflax

**Questionaire :** current 20090513 **Assessor:** Patti Clifford **Designation:** H(HPWRA)

**Status:** Assessor Approved **Data Entry Person:** Patti Clifford **WRA Score 1**

| | | | |
|---|---|---|---|
| **101** | **Is the species highly domesticated?** | **y=-3, n=0** | **n** |
| **102** | **Has the species become naturalized where grown?** | **y=1, n=-1** | |
| **103** | **Does the species have weedy races?** | **y=1, n=-1** | |
| **201** | **Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"** | **(0-low; 1-intermediate; 2-high) (See Appendix 2)** | **Low** |
| **202** | **Quality of climate match data** | **(0-low; 1-intermediate; 2-high) (See Appendix 2)** | **High** |
| **203** | **Broad climate suitability (environmental versatility)** | **y=1, n=0** | **y** |
| **204** | **Native or naturalized in regions with tropical or subtropical climates** | **y=1, n=0** | **n** |
| **205** | **Does the species have a history of repeated introductions outside its natural range?** | **y=-2, ?=-1, n=0** | **n** |
| **301** | **Naturalized beyond native range** | **y = 1*multiplier (see Appendix 2), n= question 205** | **y** |
| **302** | **Garden/amenity/disturbance weed** | **n=0, y = 1*multiplier (see Appendix 2)** | **n** |
| **303** | **Agricultural/forestry/horticultural weed** | **n=0, y = 2*multiplier (see Appendix 2)** | **n** |
| **304** | **Environmental weed** | **n=0, y = 2*multiplier (see Appendix 2)** | **n** |
| **305** | **Congeneric weed** | **n=0, y = 1*multiplier (see Appendix 2)** | **y** |
| **401** | **Produces spines, thorns or burrs** | **y=1, n=0** | **n** |
| **402** | **Allelopathic** | **y=1, n=0** | |
| **403** | **Parasitic** | **y=1, n=0** | **n** |
| **404** | **Unpalatable to grazing animals** | **y=1, n=-1** | |
| **405** | **Toxic to animals** | **y=1, n=0** | **n** |
| **406** | **Host for recognized pests and pathogens** | **y=1, n=0** | |
| **407** | **Causes allergies or is otherwise toxic to humans** | **y=1, n=0** | **n** |
| **408** | **Creates a fire hazard in natural ecosystems** | **y=1, n=0** | **n** |
| **409** | **Is a shade tolerant plant at some stage of its life cycle** | **y=1, n=0** | **n** |
| **410** | **Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)** | **y=1, n=0** | **n** |
| **411** | **Climbing or smothering growth habit** | **y=1, n=0** | **n** |

| | | | |
|---|---|---|---|
| **412** | **Forms dense thickets** | **y=1, n=0** | |
| **501** | **Aquatic** | **y=5, n=0** | **n** |
| **502** | **Grass** | **y=1, n=0** | **n** |
| **503** | **Nitrogen fixing woody plant** | **y=1, n=0** | **n** |
| **504** | **Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)** | **y=1, n=0** | **n** |
| **601** | **Evidence of substantial reproductive failure in native habitat** | **y=1, n=0** | **n** |
| **602** | **Produces viable seed** | **y=1, n=-1** | **y** |
| **603** | **Hybridizes naturally** | **y=1, n=-1** | **y** |
| **604** | **Self-compatible or apomictic** | **y=1, n=-1** | |
| **605** | **Requires specialist pollinators** | **y=-1, n=0** | **n** |
| **606** | **Reproduction by vegetative fragmentation** | **y=1, n=-1** | |
| **607** | **Minimum generative time (years)** | **1 year = 1, 2 or 3 years = 0, 4+ years = -1** | |
| **701** | **Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)** | **y=1, n=-1** | |
| **702** | **Propagules dispersed intentionally by people** | **y=1, n=-1** | **y** |
| **703** | **Propagules likely to disperse as a produce contaminant** | **y=1, n=-1** | **n** |
| **704** | **Propagules adapted to wind dispersal** | **y=1, n=-1** | **n** |
| **705** | **Propagules water dispersed** | **y=1, n=-1** | |
| **706** | **Propagules bird dispersed** | **y=1, n=-1** | **n** |
| **707** | **Propagules dispersed by other animals (externally)** | **y=1, n=-1** | **n** |
| **708** | **Propagules survive passage through the gut** | **y=1, n=-1** | |
| **801** | **Prolific seed production (>1000/m2)** | **y=1, n=-1** | |
| **802** | **Evidence that a persistent propagule bank is formed (>1 yr)** | **y=1, n=-1** | |
| **803** | **Well controlled by herbicides** | **y=-1, n=1** | |
| **804** | **Tolerates, or benefits from, mutilation, cultivation, or fire** | **y=1, n=-1** | |
| **805** | **Effective natural enemies present locally (e.g. introduced biocontrol agents)** | **y=-1, n=1** | |

**Designation:** H(HPWRA) **WRA Score** **1**

**Supporting Data:**

| | | |
|---|---|---|
| 101 | 2012. WRA Specialist. Personal Communication. | [Is the species highly domesticated? No] No evidence |
| 102 | 2012. WRA Specialist. Personal Communication. | [Has the species become naturalized where grown? NA] |
| 103 | 2012. WRA Specialist. Personal Communication. | [Does the species have weedy races? NA] |
| 201 | 2012. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl | [Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"? No] Native region: Italy. |
| 202 | 2012. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl | [Quality of climate match data? 2 - High] Native region: Italy. |
| 203 | 2012. Calflora. Linaria purpurea - Calflora: Information on California plants for education, research and conservation, based on data contributed by dozens of public and private institutions and individuals, including the Consortium of Calif. Herbaria. [w | [Broad climate suitability (environmental versatility)? Yes] Elevation between 0-1640 ft. |
| 203 | 2012. Dave's Garden. PlantFiles: Linaria purpurea [Accessed November 8 2012]. http://davesgarden.com/guides/pf/go/80271/ | [Broad climate suitability (environmental versatility)?] Hardiness:<br>USDA Zone 5a: to -28.8 °C (-20 °F)<br>USDA Zone 5b: to -26.1 °C (-15 °F)<br>USDA Zone 6a: to -23.3 °C (-10 °F)<br>USDA Zone 6b: to -20.5 °C (-5 °F)<br>USDA Zone 7a: to -17.7 °C (0 °F)<br>USDA Zone 7b: to -14.9 °C (5 °F)<br>USDA Zone 8a: to -12.2 °C (10 °F)<br>USDA Zone 8b: to -9.4 °C (15 °F) |
| 203 | 2012. Missouri Botanical Garden. Linaria purpurea [accessed 7 November 2012]. http://www.missouribotanicalgarden.org/gardens-gardening/your-garden/plant-finder/plant-details/kc/a242/linaria-purpurea.aspx | [Broad climate suitability (environmental versatility)? Yes] USDA Hardiness Zones: 5-9. |
| 204 | 2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia | [Native or naturalized in regions with tropical or subtropical climates? No] No evidence of naturalization in tropical or subtropical climates. |
| 205 | 2012. WRA Specialist. Personal Communication. | [Does the species have a history of repeated introductions outside its natural range? No] No evidence of repeated introductions. |
| 301 | 2012. Calflora. Linaria purpurea - Calflora: Information on California plants for education, research and conservation, based on data contributed by dozens of public and private institutions and individuals, including the Consortium of Calif. Herbaria. [w | [Naturalized beyond native range? Yes] Naturalized in California. |
| 302 | 2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia | [Garden/amenity/disturbance weed? No] No evidence. |
| 303 | 2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia | [Agricultural/forestry/horticultural weed? No] No evidence. |
| 304 | 2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia | [Environmental weed? No] No evidence. |
| 305 | 1996. Vujnovic, K./Wein, R.W.. The biology of Canadian weeds. 106. Linaria dalmatica (L.) Mill.. Canadian Journal of Plant Science. | [Congeneric weed? Yes] Linaria dalmatica is a serious invasive weed in Canada and the United States. It invades rangelands, agricultural crops and waste areas. |
| 305 | 2003. Pauchard, A./Alaback, P.B./Edlund, E.G.. Plant invasions in protected areas at multiple scales: Linaria vulgaris (Scrophulariaceae) in the West Yellowstone area. Western North American Naturalist. 63: 416-428. | [Congeneric weed? Yes] Linaria vulgaris is a significant threat to native biodiversity in open, human or naturally disturbed environments in protected areas of the Rocky Mountains. |

| | | |
|---|---|---|
| 401 | 2012. Preston, R.E./Wetherwax, M.. Linaria purpurea in Jepson Flora Project (eds.) Jepson eFlora [Accessed November8 2012]. http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=31087 | [Produces spines, thorns or burrs? No] Perennial herb, generally glabrous.<br>Stem: erect, simple or branched at base.<br>Leaf: generally opposite or whorled (or distal alternate), sessile, linear to ovate, generally wider on non- flower shoots, entire to dentate, pinnately veined. |
| 402 | 2012. WRA Specialist. Personal Communication. | [Allelopathic? Unknown] |
| 403 | 2010. Nickrent, D.. The parasitic plant connection. Department of Plant Biology, Southern Illinois University, Carbondale http://www.parasiticplants.siu.edu/index.html | [Parasitic? No] Not parasitic plant family, genus, or species. |
| 404 | 2012. WRA Specialist. Personal Communication. | [Unpalatable to grazing animals? Unknown] |
| 405 | 2008. Wagstaff, D.J.. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL http://books.google.com/books?id=h7tbd-5ZAQ8C&pg=PA17&lpg=PA17&dq=international+poisonous+plants+checklist+an+evidence-based+reference&s | [Toxic to animals? No] No evidence. |
| 405 | 2012. National Center for Biotechnology Information. PubMed. http://www.ncbi.nlm.nih.gov/sites/entrez | [Toxic to animals? No] No evidence. |
| 405 | 2012. Specialized Information Services, U.S. National Library of Medicine. TOXNET toxicology data network [online database]. National Institutes of Health, http://toxnet.nlm.nih.gov/ | [Toxic to animals? No] No evidence. |
| 406 | 2012. Missouri Botanical Garden. Linaria purpurea [accessed 7 November 2012]. http://www.missouribotanicalgarden.org/gardens-gardening/your-garden/plant-finder/plant-details/kc/a242/linaria-purpurea.aspx | [Host for recognized pests and pathogens? ] No frequently occurring insect or disease problems. Root rot and stem rot are occasional problems, particularly in wet, poorly-drained soils. |
| 406 | 2012. WRA Specialist. Personal Communication. | [Host for recognized pests and pathogens? Unknown] |
| 407 | 2008. Wagstaff, D.J.. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL http://books.google.com/books?id=h7tbd-5ZAQ8C&pg=PA17&lpg=PA17&dq=international+poisonous+plants+checklist+an+evidence-based+reference&s | [Causes allergies or is otherwise toxic to humans? No] No evidence. |
| 407 | 2012. National Center for Biotechnology Information. PubMed. http://www.ncbi.nlm.nih.gov/sites/entrez | [Causes allergies or is otherwise toxic to humans? No] No evidence. |
| 407 | 2012. Specialized Information Services, U.S. National Library of Medicine. TOXNET toxicology data network [online database]. National Institutes of Health, http://toxnet.nlm.nih.gov/ | [Causes allergies or is otherwise toxic to humans? No] No evidence. |
| 408 | 2012. WRA Specialist. Personal Communication. | [Creates a fire hazard in natural ecosystems? No] No evidence of biomass buildup that promotes fire. |
| 409 | 2012. Dave's Garden. PlantFiles: Linaria purpurea [Accessed November 8 2012]. http://davesgarden.com/guides/pf/go/80271/ | [Is a shade tolerant plant at some stage of its life cycle? No] Full sun. |
| 409 | 2012. Missouri Botanical Garden. Linaria purpurea [accessed 7 November 2012]. http://www.missouribotanicalgarden.org/gardens-gardening/your-garden/plant-finder/plant-details/kc/a242/linaria-purpurea.aspx | [Is a shade tolerant plant at some stage of its life cycle? No] Full sun. |
| 410 | 2012. Dave's Garden. PlantFiles: Linaria purpurea [Accessed November 8 2012]. http://davesgarden.com/guides/pf/go/80271/ | [Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? No] Soil pH requirements:<br>6.1 to 6.5 (mildly acidic)<br>6.6 to 7.5 (neutral)<br>7.6 to 7.8 (mildly alkaline) |

| | | |
|---|---|---|
| 410 | 2012. Missouri Botanical Garden. Linaria purpurea [accessed 7 November 2012]. http://www.missouribotanicalgarden.org/gardens-gardening/your-garden/plant-finder/plant-details/kc/a242/linaria-purpurea.aspx | [Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? No] Prefers a well-drained sandy soil. Dislikes heavy clay, poorly-drained and/or wet soils where it is susceptible to root rot. |
| 411 | 2012. Preston, R.E./Wetherwax, M.. Linaria purpurea in Jepson Flora Project (eds.) Jepson eFlora [Accessed November8 2012]. http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=31087 | [Climbing or smothering growth habit? No] Perennial herb. |
| 412 | 2012. Preston, R.E./Wetherwax, M.. Linaria purpurea in Jepson Flora Project (eds.) Jepson eFlora [Accessed November8 2012]. http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=31087 | [Forms dense thickets? Unknown] |
| 501 | 2012. Preston, R.E./Wetherwax, M.. Linaria purpurea in Jepson Flora Project (eds.) Jepson eFlora [Accessed November8 2012]. http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=31087 | [Aquatic? No] Perennial herb; terrestrial. |
| 502 | 2012. Preston, R.E./Wetherwax, M.. Linaria purpurea in Jepson Flora Project (eds.) Jepson eFlora [Accessed November8 2012]. http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=31087 | [Grass? No] Plantaginaceae. |
| 503 | 2012. Preston, R.E./Wetherwax, M.. Linaria purpurea in Jepson Flora Project (eds.) Jepson eFlora [Accessed November8 2012]. http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=31087 | [Nitrogen fixing woody plant/ No] Perennial herb. |
| 504 | 2012. Preston, R.E./Wetherwax, M.. Linaria purpurea in Jepson Flora Project (eds.) Jepson eFlora [Accessed November8 2012]. http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=31087 | [Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] Perennial herb from stout, woody herb stock. |
| 601 | 2012. WRA Specialist. Personal Communication. | [Evidence of substantial reproductive failure in native habitat? No] No evidence. |
| 602 | 2012. Dave's Garden. PlantFiles: Linaria purpurea [Accessed November 8 2012]. http://davesgarden.com/guides/pf/go/80271/ | [Produces viable seed? Yes} Propagate from seed. |
| 603 | 1982. Stace, C.A.. Segregation in the natural hybrid Linaria purpurea (L.) Mill. X Linaria repens (L.) Mill.. Watsonia. 14 (pt.1): 53-57. | [Hybridizes naturally? Yes] Linaria purpurea (L.) Mill. has naturally hybridized with Linaria repens (L.) Mill. |
| 604 | 2012. WRA Specialist. Personal Communication. | [Self-compatible or apomictic? Unknown] |
| 605 | 1984. Quinn, P.. Survey of native bees (Hymenoptera: Colletidae and Halictidae) in the Mackenzie Basin. New Zealand Entomologist. 8: 42-44. | [Requires specialist pollinators? No] Linaria purpurea is visited by the native bee, Hylaeus capitosus in the Mackenzie Basin, New Zealand. |
| 605 | 2012. North American Pollinator Protection Campaign. Your urban garden is better with bees [Accessed 7 November 2012]. North American Pollinator Protection Campaign, www.nappc.org | [Requires specialist pollinators? No] Attracts a variety of bee species. |
| 605 | 2012. Xerces Society. Pollinator plants for Southern California: coastal and foothill regions. | [Requires specialist pollinators? No] The Xerces Society for Invertebrate Conservation recommends Linaria purpurea as a pollinator plant for Southern California coast and foothill regions. |
| 606 | 2012. WRA Specialist. Personal Communication. | [Reproduction by vegetative fragmentation? Unknown] |
| 607 | 2012. WRA Specialist. Personal Communication. | [Minimum generative time (years)?Unknown] |
| 701 | 2012. WRA Specialist. Personal Communication. | [Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Unknown] |

| | | |
|---|---|---|
| 702 | 2012. Dave's Garden. PlantFiles: Linaria purpurea [Accessed November 8 2012]. http://davesgarden.com/guides/pf/go/80271/ | [Propagules dispersed intentionally by people? Yes] Members of Dave's Garden either have Linaria purpurea for sale, trade or want it. |
| 703 | 2012. WRA Specialist. Personal Communication. | [Propagules likely to disperse as a produce contaminant? No evidence.] |
| 704 | 2012. Preston, R.E./Wetherwax, M.. Linaria purpurea in Jepson Flora Project (eds.) Jepson eFlora [Accessed November8 2012]. http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=31087 | [Propagules adapted to wind dispersal? No] Fruit a capsule; seed ± 1 mm, ± pyramid-shaped, ridged. |
| 705 | 2012. WRA Specialist. Personal Communication. | [Propagules water dispersed? Unknown] |
| 706 | 2012. Preston, R.E./Wetherwax, M.. Linaria purpurea in Jepson Flora Project (eds.) Jepson eFlora [Accessed November8 2012]. http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=31087 | [Propagules bird dispersed? No] Fruit a capsule. |
| 707 | 2012. Preston, R.E./Wetherwax, M.. Linaria purpurea in Jepson Flora Project (eds.) Jepson eFlora [Accessed November8 2012]. http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=31087 | [Propagules dispersed by other animals (externally)? No] Fruit a capsule. [no means of attachment] |
| 708 | 2012. WRA Specialist. Personal Communication. | [Propagules survive passage through the gut? Unknown] |
| 801 | 2012. WRA Specialist. Personal Communication. | [Prolific seed production (>1000/m2)? Unknown] |
| 802 | 2012. WRA Specialist. Personal Communication. | [Evidence that a persistent propagule bank is formed (>1 yr)? Unknown] |
| 803 | 2012. WRA Specialist. Personal Communication. | [Well controlled by herbicides? Unknown] |
| 804 | 2012. WRA Specialist. Personal Communication. | [Tolerates, or benefits from, mutilation, cultivation, or fire? Unknown] |
| 805 | 2012. WRA Specialist. Personal Communication. | [Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown |

## Summary of Risk Traits

### High Risk / Undesirable Traits

• Broad climate tolerance
• Naturalized in California
• Several species in the genus are serious weeds (Linaria dalmatica and L. vulgaris)
• Dispersed by humans

### Low Risk / Desirable Traits

• Not a known invasive elsewhere (not widely introduced)
• Unarmed (no spines, thorns, burrs)
• Non-toxic
• Requires full sun
• Not tolerant of a wide variety of soils