



ILLINOIS

---

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

**PRODUCTION NOTE**

University of Illinois at  
Urbana-Champaign Library  
Large-scale Digitization Project, 2007.



**Population Viability Assessment  
for  
Hairy valerian  
(Valeriana edulis Nuttall var. ciliata (Torr. & Gray) Cronq.)**

Brenda Molano-Flores

Center for Biodiversity  
Technical Report 2000 (10)

Illinois Natural History Survey  
607 East Peabody Drive  
Champaign, Illinois 61820

Prepared for:  
Midewin National Tallgrass Prairie  
30071 South St. Rt. 53  
Wilmington, IL 60481

1 February 2000

POPULATION VIABILITY ASSESSMENT  
FOR  
HAIRY VALERIAN (VALERIANA EDULIS NUTTALL VAR. CILIATA  
(TORR. & GRAY) CRONQ.)

SCIENTIFIC NAME: Valeriana edulis Nuttall var. ciliata (Torr. & Gray) Cronq.

COMMON NAME: Hairy valerian, edible valerian

FAMILY: Valerianaceae

SYNONYMS: Valeriana ciliata Torr. & Gray, Valeriana edulis Nuttall ssp. ciliata (Torr. & Gray) F. G. Mey.

USFS REGION 9 STATUS: Sensitive Species

USFW STATUS: None

ILLINOIS STATUS: None

GLOBAL AND STATE RANK: N3/G5T3?

RANGE: This species can be found in Illinois, Indiana, Iowa, Michigan, Ohio, Minnesota, Wisconsin, and Ontario (figure 1). In Illinois, this species has been reported in 12 counties: Cook, DeKalb, DuPage, Grundy, Henry, Kane, Kendall, Lake, McHenry, Stephenson, Will, and Winnebago (figure 2).

PHYSIOGRAPHIC DISTRIBUTION: Valeriana edulis var. ciliata can be found in the Southwestern Great Lakes Moraines Section of the Eastern Broadleaf Forest Continental Province and the Central Till Plains Section of the Prairie Parkland Temperate Province (Key et al., 1995). Based upon the Natural Divisions of Illinois (Schwegman et al., 1973), Valeriana edulis var. ciliata can be found in the Rock River Hill County Division, Northeastern Morainal Division, and Grand Prairie Division (Eric Ulaszek per. comm.).

HABITAT: This species can be found in mesic-wet prairies and calcareous fens (Swink and Wilhelm, 1994; Eric Ulaszek per. comm.). It may also be found in dolomite prairies and in moist areas such as wooded valleys, stream banks, and open meadows (William Handel per. comm.; Weedon, 1986). Plants associated with Valeriana edulis var. ciliata in prairies are: Andropogon gerardii, Andropogon scoparius, Aster azureus, Desmodium canadense, Dodecatheon meadia, Euphorbia corollata, Hypoxis hirsuta, Liatris spicata, Lithospermum canescens, Phlox pilosa fulgida, Pycnanthemum virginianum, Ratibida pinnata, Silphium integrifolium deamii, Silphium terebinthinaceum, and Sporobolus heterolepis (Swink and Wilhelm, 1994).

**SPECIES DESCRIPTION:** Gynodioecious perennial forb, 1-2 dm tall with a conical semiwoody taproot. Opposite leaves predominantly basal. Cauline leaves pinnately parted, with entire or rarely with 1-2 basal divisions, and parallel venation. Inflorescence paniculiform with numerous flowers. White to light cream-yellow flowers. Hermaphroditic flowers (2.5-3.5 mm long) larger than female flowers (0.5-1 mm long). Fruit an ovate to oblong achene. This species can be confused with cultivar forms of the European Valeriana officinalis.

**LIFE HISTORY:** Valeriana edulis var. ciliata blooms from April to June (Swink and Wilhelm, 1994). This species is gynodioecious, meaning that it has both female and hermaphroditic individuals (Weedin, 1986). No additional information is available regarding the breeding system or pollinators associated with the species. Rock (1974) suggests that Valeriana edulis var. ciliata seeds will need cold stratification for germination. It is possible that the persistence of Valeriana edulis var. ciliata in the soil seed bank may be short as a consequence of a fragile seed coat (Steven R. Hill per. comm.). Information regarding seed dispersal for this species is not available. However, because the species has a small (2-4.5 mm long and 1.5-3 mm wide) glabrous to densely short-haired achene (Weedin, 1986), most likely, the seeds will fall and stay under the maternal plant. Also, it is possible that because of its habitat, water can disperse the seeds a long distance. In Illinois, this species has been reported from 12 counties (Mohlenbrock and Ladd, 1978 and [www.fs.fed.us/ne/delaware/ilpin/V.htm](http://www.fs.fed.us/ne/delaware/ilpin/V.htm)), but no information regarding population size is available.

**NATURAL AND HUMAN LAND USE THREATS:** Because Valeriana edulis var. ciliata is considered a conservative species (Swink and Wilhelm, 1994) highly associated with prairies and calcareous fens, concern regarding the decline of this species in the region is evident. The main threat to this species is the loss of habitat as a consequence of development (e.g. draining of wetlands), agriculture, and grazing. Grazing can be a problem for this species because is very edible to deer, cattle, etc. (Steven R. Hill per. comm.). Because this species requires wet habitats, any changes in the hydrology or an increase in shade caused by vegetation encroachment may have a negative impact on the species (TNC-BioSources, 1999).

**VIABILITY:** To maintain minimum viable populations of Valeriana edulis var. ciliata throughout its habitat range, protection, management, and restoration of habitat should be provided as much as possible. A minimum viable population is defined as a population size likely to give a population a 95% probability of surviving over a 100 year period (Menges, 1992). To insure viability:

1. It is vital that the size of the existing populations be maintained or increased to insure the persistence of the species in the region. It is also necessary that local seed sources are available for future reintroductions of the species to other areas. The only way to accomplish such a task is by protecting the already existing seed sources (i.e. populations) that are available in the region.

2. The creation and maintenance of a metapopulation for Valeriana edulis var. ciliata is crucial for the persistence of the species in the region. A metapopulation is as an assemblage of populations existing in a balance between extinction and colonization, the boundaries of which can be a site or a geographical region (Husband and Barrett, 1996; Levins 1969, 1970). The populations that will form this metapopulation should be large because they can have a better opportunity of persistence than small populations (Hanski et al., 1996). Hanski et al. (1996) have suggested, based upon models, that a metapopulation should consist of a minimum of 15-20 well connected populations. However, Hanski et al. (1996) point out that if this cannot be achieved, the few remaining populations and habitats should be protected and other management techniques should be used to allow the persistence of these populations. Also, based upon models, populations should be >200 individuals to avoid demographical and environmental stochasticity (Menges, 1992). This number can be higher or lower depending upon the species.

The existing populations of Valeriana edulis var. ciliata in the region potentially can go extinct as a consequence of low recruitment, stochastic event, etc. By having a metapopulation this situation may be prevented. Also, by having a metapopulation, other interactions that will impact the overall viability of Valeriana edulis var. ciliata in the region, such as pollinator interactions, genetic structure, gene flow between and within populations, and seed dispersal, can be maintained.

3. Protection of existing and newly discovered populations in the region should be attempted. Protection of these populations also implies protection of their habitat.

MANAGEMENT: To maintain minimum viable populations of Valeriana edulis var. ciliata throughout its habitat range, specific management practices will be needed to insure the persistence of the species in the region.

1. To maintain and increase existing populations of Valeriana edulis var. ciliata, specific practices should be followed:

a. Management techniques such as removal of vegetation (e.g. woody, noxious weeds, etc.) and prescribed burnings should be used to avoid encroachment in existing habitat. Grazing is not recommended for this species because is very edible to cattle (Steven R. Hill per. comm.). The use of an Integrated Pest Management Plan such as the one developed by Carroll and White (1997) can be used to control exotic species in these areas.

b. Fencing of individuals may be required to avoid deer browsing.

c. Activities that increase the likelihood of noxious weed introduction or cause trampling (e.g. humans or animals) of the plants should be avoided or minimized.

d. Development of trails in areas where Valeriana edulis var. ciliata is found should be avoided or minimized to prevent negative impacts to the populations.

2. To develop and maintain a metapopulation of Valeriana edulis var. ciliata, attempts should be made to restore or reintroduce Valeriana edulis var. ciliata in areas that were historically wet-mesic prairie. This includes the improvement of areas that have wet-mesic prairie and the reconstruction of areas that have lost the wet-mesic prairie plant matrix. Potential habitat can be sites that have soils that are found in wet-mesic prairies. The following is a list of soils found in wet-mesic prairies (Laatsch and Loebach, 1997; Eric Ulaszek per. comm.): Ashkum silty clay loam (soil depth less than 42" over till), Brenton silt loam (soil depth 1.5-3.0 ft. over outwash), Elliot silt loam (soil depth less than 2.0 ft. over till), Joliet silty clay loam (soil depth 10-25" over bedrock), Varna silt loam (soil depth NA), and Warsaw silt loam (soil depth less than 2.0-3.5 ft. over gravel drift).

To maintain and increase these populations of Valeriana edulis var. ciliata, the following practices should be considered in addition to those measures outlined under 1 of this section:

- a. Seeds (hermaphroditic and female individuals) should be collected from nearby populations (e.g. 50-100 miles from the site) to develop seedlings and rootstock.
- b. Freshly sown seeds and hand plantings of seedlings should be used to develop populations in the proper areas. Rock (1974) suggests that seedlings transplanted to the field will bloom the following spring.
- c. Periodic flooding may be required to cut down on competition and for the establishment of seedlings (Steven R. Hill per. comm.).
- d. Monitoring and evaluation should be conducted for any restored or reintroduced populations. In the event that a restored or reintroduced population is unsuccessful, a site's potential for a second reintroduction or restoration attempt should be reevaluated. This may require additional research.

3. In the case that additional populations of Valeriana edulis var. ciliata are found in the region, they should be marked and protected from any potential damage and the above practices for maintenance and enhancement of these populations should be followed. Their habitat should also be protected.

**MONITORING:** In natural populations, regular counts of individuals (i.e. male and hermaphroditic individuals) should be done to determine population status. Transects and quadrats should be used to determine the size of a population in a large area. Hand counts can be done if a population is small (less than 100 individuals). In restorations, sampling should be done as above to detect increases or decreases in the population. If no significant changes (i.e. increase or decrease) are detected, reevaluation of seeding techniques and management practices should be done to enhance the population.

RESEARCH NEEDS: Immediate research needs for *Valeriana edulis* var. *ciliata* that will help in the establishment and management of the species are:

1. Collect information on several aspects of the natural history (e.g. specific habitat requirements, seedling establishment, etc.) of the species. This will allow a better understanding of how and where the species can be reintroduced.
2. Determine several aspects of the reproductive biology (e.g. breeding system, pollinators, and male:hermaphroditic ratios) of the species. This information will help us understand factors that may impair the persistence of populations in an area or in the reintroduction of the species to an area.
3. Collect demographic and population size information. This information is needed to determine the population structure and population changes (i.e. increases or decreases) of the species. With this information, specific recommendations can be made if, for example, the population is declining or only seedlings are found.
4. Develop a Population Viability Analysis (PVA). A PVA identifies the threats faced by a species and can evaluate the likelihood that the species will persist for a given time into the future. To develop a PVA, field studies, data analysis, modeling, assessment of extinction risks, sensitivity analysis, and monitoring, among other things, are needed.
5. Determine the impact of different management (e.g. grazing, fire) and recreational activities. It is important to determine the best management practice(s) to improve the habitat for the species. It is also important to determine which recreational activities are compatible with the species. This will prevent any risks to the species and its habitat.

## REFERENCE LIST

### a) Literature cited

Carroll, C. J. and J. White. 1997. Integrated Pest Management Methods for Control of Invasive Exotic Plant Species at Midewin National Tallgrass Prairie. Unpublished report by Ecological Services for the Illinois Department of Natural Resources, Springfield, IL.

Hanski, I., A. Moilanen, and M. Gyllenberg. 1996. Minimum viable metapopulation size. *The American Naturalist* 147: 527-541.

Husband, B. C. and S. C. H. Barrett. 1996. A metapopulation perspective in plant population biology. *Journal of Ecology* 84: 461-469.

Key, J. Jr., C. Carpenter, S. Hooks, F. Koenig, W. H. McNab, W. Russell, and M. L. Smith. 1995. Ecological Units of the Eastern United States-First Approximation (map and booklet of map unit tables). U.S. Department of Agriculture-Forest Service, Atlanta, GA.

- Laatsch, J. and B. Loebach. 1997. Midewin Ecological Unit Map and Summaries. Unpublished report by Division of Natural Heritage-Illinois Department of Natural Resources, Springfield, IL.
- Levins, R. 1969. Some demographical and genetic consequences of environmental heterogeneity for biological control. *Bulletin of the Entomological Society of America* 15: 237-240.
- Levins, R. 1970. Extinction. *In* Lectures on Mathematics in the Life Sciences, 2. ed. M. Gerstenhaber. Pp. 77-107. American Mathematical Society, Providence, RI.
- Menges, E. S. 1992. Stochastic modeling of extinction in plant populations. *In* Conservation Biology: The Theory and Practice of Nature Conservation, Preservation, and Management. eds. P. L. Fiedler and S. Jain. Pp. 253-275. Chapman and Hall, New York, NY.
- Mohlenbrock, R. H. and D. M. Ladd. 1978. Distribution of Illinois Vascular Plants. Southern Illinois University Press, Carbondale, IL.
- Rock, H. W. 1974. Prairie propagation handbook. 3<sup>rd</sup> ed. Boerner Botanical Garden-Whitnall Park, Milwaukee, WI.
- Schwegman, J. E., G. D. Fell, J. Hutchinson, G. Paulson, W. M. Shepard, and J. White. 1973. Comprehensive Plan for the Illinois Nature Preserve Commission. Part II - The Natural Divisions of Illinois. Illinois Nature Preserve Commission, Springfield, IL.
- Swink, F. and G. Wilhelm. 1994. Plants of the Chicago Region. 4<sup>th</sup> ed. Indiana Academy of Science, Indianapolis, IN.
- TNC-BioSources. 1999. An electronic database housed in The Nature Conservancy.
- Weedin, R. R. 1986. Valerianaceae Batsch, the valerian family. *In* Flora of the Great Plains. ed. Great Plains Flora Association. Pp.833-836. University Press of Kansas, Lawrence, KS.
- b) Web pages cited
- [www.fs.fed.us/ne/delaware/ilpin/V.htm](http://www.fs.fed.us/ne/delaware/ilpin/V.htm)
- [www.itis.usda.gov/plantproj/plants/cgi\\_bin/fr\\_enter.cgi?earl=fr\\_qurymenu](http://www.itis.usda.gov/plantproj/plants/cgi_bin/fr_enter.cgi?earl=fr_qurymenu)
- c) Personal communication
- William Handel. Illinois Natural History Survey-Center for Biodiversity. 607 East Peabody Drive. Champaign, Illinois 61820. Phone number: 217-244-2109.

Steven R. Hill. Illinois Natural History Survey-Center for Biodiversity. 607 East Peabody Drive. Champaign, Illinois 61820. Phone number: 217-244-8452.

Eric Ulaszek. U.S. Forest Service. Midewin National Tallgrass Prairie. 30071 South State Route 53. Wilmington, Illinois 60481. Phone number: 815-432-6370.

Figure 1) Distribution of *Valeriana edulis* var. *ciliata* in the United States of America ([www.itis.usda.gov/plantproj/plants/cgi\\_bin/fr\\_enter.cgi?earl=fr\\_qurymenu](http://www.itis.usda.gov/plantproj/plants/cgi_bin/fr_enter.cgi?earl=fr_qurymenu)).

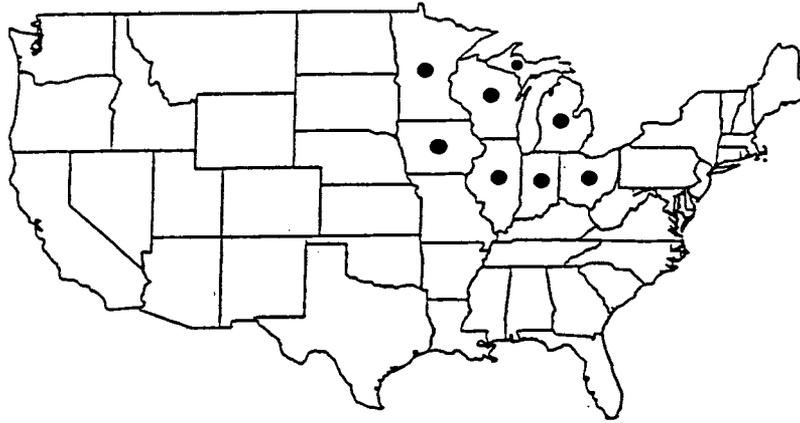


Figure 2) Distribution of *Valeriana edulis* var. *ciliata* in Illinois (Mohlenbrock and Ladd, 1978 and [www.fs.fed.us/ne/delaware/ilpin/V.htm](http://www.fs.fed.us/ne/delaware/ilpin/V.htm)).

