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False Hellebore (*Veratrum woodii*, Liliaceae) Populations in Illinois

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ABSTRACT

False hellebore, a course perennial lily, has a very limited range in the east-central United States. It is listed as threatened in Illinois since few populations are known, the known populations are small, and few flowering and fruiting individuals are observed. The structure and habitat on 31 Illinois populations of this species were examined over a seven year period from 1985 to 1992. Population size varied from very few individuals to nearly 400, with more than 60% of the populations having fewer than 25 individuals. Most of the populations had an increase in individuals during the seven year study. During the study only four flowering plants were observed, two of which set fruit. Most populations were on relatively steep, moist, wooded hillsides, though the largest populations occurred in terrace forests at the base of steep hillsides.

Veratrum woodii Robbins. is a tall, course perennial from a stout, vertical underground stem that is invested by the fibrous remnants of old leaves. The basal leaves are narrowly elliptic to broadly oblanceolate, parallel-veined, to 40 cm long, and to 11 cm wide. The infrequently produced flowering stems are to 1.5 m tall with alternate leaves that are nearly linear and greatly reduced in length and width. The flowering panicle is 30-60 cm long, slender, with the short lower branches bearing mostly staminate flowers, while the central and upper branches bear perfect flowers. The perianth segments are entire, vary from greenish-purple to dark maroon, are oblanceolate, narrowed at the base, and obtuse to subacute at the apex. The few-seeded capsule is 20-25 mm long. This species, as well as many others in the genus, contain alkaloids and other compounds that have been used medically for hundreds of years (Kupchan et al. 1961).

False hellebore, which occurs in terrace forests and on moist wooded hillsides, is presently known from only a few states (Ohio, Indiana, Illinois, Iowa, Kentucky, Missouri, Oklahoma and northern Florida), and is apparently not abundant anywhere (Fernald 1950, Kupchan et al. 1961, Mohlenbrock 1970, Clewell 1985). In Illinois, it is mostly restricted to the central counties. The first known collection in Illinois was made by S. B. Mead in Hancock County in 1843 (Kibbe 1952). It was reported for Madison County by McDonald (1892), and later in Adams County (Jones and Fuller 1955, Henry 1978). Jones and Fuller (1955) recorded it for eight counties (Adams, Coles, Cumberland, Effingham, Hancock, Madison, McLean, Vermilion), and in an updating of this work by Winterringer and Evers (1960) the same eight counties were listed. More recently this species has been reported from Clark County (Hellinga and Ebinger 1970), Crawford and Edgar Counties (Mohlenbrock and Ladd 1978), Fayette County (Shildneck

et al. 1981), and Shelby County (Herkert 1991), bringing the total number of county records to 13.

This species is presently listed as threatened in Illinois (Herkert 1991) since relatively few populations are known, the populations generally have only a few individuals (less than 50), and the individuals rarely flower. The present study was undertaken to determine the structure of a number of populations of the species, determine the extent of flowering, to record changes in population structure over the past seven years, and to examine the habitat in which this species occurs in Illinois.

MATERIALS AND METHODS

During the present study, 31 populations of *Veratrum woodii* were examined. Twenty three of these populations were first studied in 1985, while others were found more recently. Most populations were originally located by examining herbarium specimens from most state herbaria (EIU, ILL, ILLS, ISM, MWI, SIU), consulting literature sources, and contacting many of the state's field botanists. For the sites first studied in 1985, the general characteristics of the habitat were recorded, including the degree of slope, tree species present along with their densities (#/ha) and average diameters, the extent of the woody understory, the herbaceous species associated with the false hellebore population, and an estimate of the herbaceous cover. Also, the number of false hellebore individuals found was recorded. The overstory characteristics were determined by delineating a quadrat 25 m on a side centered over the false hellebore population. All trees greater than 10 cm dbh were identified and their diameters recorded.

During the summer of 1992 the sites examined in 1985 were visited along with a few found more recently. An accurate count of the false hellebore individuals at each site was made by searching the area and placing red marker flags next to each plant located. In addition, the following data were recorded:

1. a list of the herbaceous species present at each site (Mohlenbrock 1986), and
2. the number of leaves on each *Veratrum woodii* plant, the extent of clumping (individuals growing within 2 cm of each other and appearing to be coming from the same root system), the number of flowering individuals, and the total number of juvenile and mature individuals (a plant was considered juvenile if it had five or fewer leaves that were generally narrower and shorter than those found on mature plants).

RESULTS AND DISCUSSION

Structure of the false hellebore populations

Of the 31 populations studied, most (61%) were relatively small, containing fewer than 25 individuals. Of the remaining, most had fewer than 100 individuals, but three populations (all associated with terrace forests) contained more than 100 individuals, one with nearly 400 individuals (Table 1).

Of the 23 populations studied in 1985 and again in 1992, 15 increased in size, five decreased slightly, and three remained the same (Table 1). Some of this increase, particularly in the larger populations, may be due to better survey techniques, but even in

small populations in which individuals had been mapped, new individuals were recorded. Some of this increase was due to the increased number of juveniles that were clumped with mature individuals.

Within most populations juveniles were relatively common, accounting for up to half of the individuals present on the site (Table 1). In many instances these juveniles were clumped, with 2-7 individuals growing together (less than 2 cm apart). These clumped individuals appeared to be off-shoots from the vertical underground stem of a mature individual, but no physical connection could be found in the five clumps examined. As a result, these are probably genetically different individuals, and not the result of asexual reproduction. The extent of clumping (%) was recorded for each population, as was the number of individuals per clump during the 1992 survey (Table 1).

No information is available concerning the longevity of false hellebore individuals, however, populations of this species appear to survive for extended periods of time if the habitat is not altered greatly. This is indicated by the fact that some of the populations were first collected (or reported) between 40 and 50 years ago (Table 1). Also, most of the marked and mapped individuals from the 1985 study were relocated, indicating that these individuals were at least seven years old.

Flowering of false hellebore individuals

All indications suggest this perennial species rarely flowers since most of the populations examined lacked flowering specimens. During the 1985 survey, two flowering individuals were found and two others had current year flower stalks that had been broken (or eaten). No flowering specimens were observed during the summer or fall of 1992. Also, most of the populations that were first examined in 1985 were visited at least once or twice between 1985 and 1991, and rarely were flowering or fruiting plants observed. If these results are typical, the rarity of flowers may greatly limit successful pollination and seed production and few new individuals will be recruited into the population. Schwegman (1990, 1992) obtained similar results in a continuing study of a marked population in central Illinois.

Habit of the false hellebore sites

At the majority of the sites, false hellebore populations were growing on a relatively steep N- to NE-facing hillsides that had a slope of 10 to 30 (40) degrees. Though most populations were associated with N-facing hillsides, some were located on E-or W-facing hillsides, and rarely on S-facing slopes. At a few sites, the populations were on nearly level terraces at the base of steep hillsides.

Woody overstory and understory of the false hellebore sites

At the false hellebore sites, the woody overstory was dominated by species typically associated with mesic hillside and terrace forests, and had a cover of 85-95%. On the steep hillsides the most common overstory species was usually *Acer saccharum* Marsh. (sugar maple), followed by *Quercus rubra* L. (red oak), *Carya cordiformis* (Wang.) K. Koch (bitternut hickory), and *Quercus alba* L. (white oak). The populations located on terraces at the base of steep slopes had an overstory dominated by sugar maple, *Ulmus rubra* Muhl. (slippery elm), *U. americana* L. (American elm), *Fraxinus pennsylvanica* Marsh. (green ash), and bitternut hickory. Some site were dominated by relatively large

trees with average densities of 208 to 304 #/ha and average diameters of 24 to 34 cm while other sites were dominated by many small trees with average densities of 497-655 #/ha and average diameters of 19-22 cm (Table 1).

At most sites very few woody understory individuals were present, and the sites were very open and park-like under the tree canopy. Generally a few seedlings and saplings of the overstory species were present along with occasional individuals of *Staphylea trifolia* L. (bladdernut), *Hydrangea arborescens* L. (hydrangea), *Corylus americana* Walt. (hazelnut), *Viburnum prunifolium* L. (black haw), and in the terrace forests, *Asimina triloba* (L.) Dunal (pawpaw).

Herbaceous plants associated with the false hellebore populations

The herbaceous cover in the false hellebore populations was highly variable, ranging from as low as 15% to nearly 100%. In general, the cover was greater than 40%, and species richness was extremely high with more than 120 species found in association. All were common woodland species typically found on mesic hillside forest communities of central Illinois. The common species encountered are listed in Table 2.

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Table 1: Structure of the *Veratrum woodii* Robins. populations examined in 1985 and 1992, and the density (#/ha) and average diameter (cm) of the woody overstory recorded for the sites examined in 1985.

County and Site[1]	Year First Report[2]	1985 # of Ind.	1992 # of Ind.	Leaves/ Plant	Clumping %	Avg. # Ind./ Clump	Overstory Density (#/ha)	Overstory Av. Diam. (cm)
Clark #1	1967	5	6 (2)[3]	6.0	0	---	225	30
Coles #1	1985	3	8 (1)	7.1	0	---	257	31
#2	1946	1	1 (0)	7.0	0	---	561	19
#3	1946	22	19 (2)	7.9	0	---	272	31
#4	1946	326	399 (142)	6.2	29	2.7	321	23
#5	1946	43	56 (19)	6.2	16	2.3	368	26
#6	1946	28	64 (17)	6.4	9	2.0	593	21
#7	1951	16	30 (8)	6.2	6	2.0	383	19
#8	1985	2	12 (0)	7.6	0	---	271	34
#9	1992	---	187 (81)	5.7	13	2.0	---	---
#10	1986	---	5 (3)	5.2	100	2.5	---	---
#11	1988	---	10 (6)	5.3	20	2.0	---	---
Crawford #1	1972	35	44 (17)	5.7	34	2.5	400	22
#2	1972	5	11 (3)	5.6	73	2.0	321	22
Cumberland #1	1950	4	4 (2)	5.3	0	---	303	33
#2	1983	5	3 (0)	6.0	0	---	208	29
Edgar #1	1951	18	20 (6)	7.1	70	2.8	257	27
Effingham #1	1951	22	25 (9)	6.0	0	---	289	24
#2	1980	27	17 (11)	4.6	0	---	361	22
#3	1992	---	22 (10)	5.5	50	3.7	---	---
#4	1992	---	64 (43)	4.8	6	2.0	---	---
#5	1992	---	10 (3)	6.2	30	3.0	---	---
#6	1992	---	6 (3)	6.2	33	2.0	---	---
Fayette #1	1980	81	94 (53)	5.3	26	2.7	304	25
#2	1973	14	9 (6)	4.7	0	---	351	24
#3	1985	15	12 (2)	6.4	16	2.0	304	32
#4	1980	31	39 (22)	5.3	56	2.8	593	21
#5	1992	---	12 (6)	5.2	0	---	---	---
McLean #1	1951	11	11 (2)	6.5	0	---	321	26
Shelby #1	1985	14	16 (8)	5.6	38	2.3	497	21
#2	1985	146	161 (69)	5.6	33	2.8	655	21

1 Exact site locations are available on request.
2 Based on herbarium records, literature, or field observations.
3 Number of juvenile individuals observed.

Table 2. Plant species commonly assoicated with *Veratrum woodii* Robins. populations at 20 sites examined during the summer of 1992. The number to the left indicates the total sites at which the species was found. Species found at fewer than four sites are not listed.

7	*Actaea pachypoda* Ell.
7	*Arisaema triphyllum* (L.) Schott.
13	*Asarum canadense* L.
11	*Aster shortii* Lindl.
6	*Botrychium virginianum* (L.) Sw.
8	*Brachyelytrum erectum* (Schreb.) Beauv.
6	*Campanula americana* L.
4	*Carrex albursina* Sheldon
14	*Carex artitecta* Mack.
11	*Carex blanda* Dewey
6	*Circaea lutetiana* Aschers. & Magnus.
6	*Cryptotaenia canadensis* (L.) DC.
14	*Cystopteris protrusa* (Weatherby) Blasd.
4	*Elymus hystrix* L.
4	*Elymus virginicus* L.
5	*Festuca obtusa* Bieler
12	G*alium aparine* L.
5	*Galium circaezans* Michx.
8	*Galium concinnum* Torr. & Gray
11	*Geranium maculatum* L.
8	*Geum canadense* Jacq.
10	*Heptica nobilis* Mill.
4	*Hydrophyllum virginianum* L.
8	*Laportea canadensis* (L.) Wedd.
9	*Osmorhiza claytonii* (Michx.) Clarke
17	*Phlox divaricata* L.
5	*Phryma leptostachya* L.
6	*Pilea pumila* (L.) Gray
9	*Poa sylvestris* Gray
8	*Podophyllum peltatum* L.
4	*Polygonatum commutatum* (Schult.) A. Dietr.
9	*Polygonum virginianum* L.
11	*Polystichum acrostichoides* (Michx.) Schott.
7	*Sanguinaria canadensis* L.
12	*Sanicula gregaria* Bickn.
8	*Smilacina racemosa* (L.) Desf.
8	*Solidago caesia* L.
5	*Thalictrum dioicum* L.
8	*Tradescantia subaspera* Ker.
4	*Trillium recurvatum* Beck.
13	*Uvularia grandiflora* Sm.
4	*Viola sororia* Willd.