

FINAL REPORT
NORTHERN DRIFTLESS AREA SURVEY
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I- INTRODUCTION

Partial survey in 1981 and 1982 of the Driftless Area and the immediately surrounding Niagaran Escarpment (Paleozoic Plateau of Prior, 1976) has turned up approximately 100 algific talus slopes (term defined in Frest 1981, 1982, 1983). These provide essential habitat for all known colonies of the federally listed (Endangered) Iowa Pleistocene Snail (Discus macclintocki) and several other snail species, as well as for all but two Iowa sites for the Threatened Northern Monkshood (Aconitum noveboracense). A single algific site had been previously reported in Minnesota (Hartley, 1962), and it was believed probable, based on geologic criteria and a cursory survey of the botanical literature, that many such sites might exist in the Minnesota and Wisconsin portions of the Driftless Area. In the summer of 1982, roughly four weeks of field work (23 days in Minnesota, 9 days in Wisconsin) were conducted with the intent of gauging the approximate extent and distribution of algific sites in these two states.

II- METHODS

Because of the large size (roughly 10,000 sq. mi.) of the area, difficult terrain, and the short period of time available for survey, reconnaissance methods were adopted for much of it, the aim being to establish the maximum possible areal extent of suitable algific slope terrain and to delineate areas for future intensive search. Once this was established, any remaining time was spent in more detailed survey of the most "profitable" areas.

In Minnesota, areas reconnoitered included Wabasha, Olmstead, Winona, Fillmore, and Houston counties, as well as large portions of Dodge county and much smaller parts of adjacent counties. Particular emphasis was placed on the Galena outcrop area of Fillmore and Houston counties. In Wisconsin, part or all of Buffalo, Trempealeau, Lacrosse, Monroe, Vernon, Highland, Grant, Iowa, and Lafayette counties were examined, and a portion of the Galena outcrop area in Grant County (adjacent to the Iowa Buck Creek and Miners Creek sites) was explored in some detail. Collecting methods and geologic and botanical criteria employed were the same as used previously in Iowa (Frest, 1981, 1982).

III- RESULTS

A total of about 30 algific talus slopes (20 in Minnesota, 10 in Wisconsin)

were discovered. No colonies of D. macclintocki were found, but healthy populations of the other relict snails occur in both states, and it is quite possible that the Iowa Pleistocene Snail will be found with more intensive search. A number of other disjunct or rare land snails were found, including colonies of the Rocky Mountain form Vallonia gracilicosta and an unidentified (possibly new) succineid species in Minnesota, as well as populations of the disjunct Discus catskillensis and the possibly endangered Zontoides limatulus in both states.

In addition to the snails, a number of rare and unusual plants were also noted in passing in both states. Most noteworthy were healthy populations of Northern Monkshood in Wisconsin and Chrysosplenium iowense in Minnesota. Additionally, sites were recorded for such northern forms as Carex media, Mertensia paniculata, and Gymnocarpium robertianum; and for Driftless Area endemics such as Dodecatheon amethystinum in one or both states. No site was completely botanically surveyed due to lack of time and expertise, and lists of the sites should be made available to botanists in both states.

Table 1 summarizes available data for disjunct or relict elements on the newly discovered sites. Complete locality information and some additional comments are provided in Appendix I. Faunal lists (land snails) for those sites picked to date constitute Appendix II. Based on information now available, the approximate extent of algific slopes is as indicated on Figure 1: confirmed localities are covered by the black area. In summary, most of the major plant and animal elements that typify the better-known Iowa algific slopes also are found in small portions of Wisconsin and Minnesota, and further search for the Iowa Pleistocene Snail and for Northern Monkshood is justified.

Table 1. Algific talus slopes in Minnesota and Wisconsin and associated disjunct or relict biota. Asterisk indicates new records.

LOCALITY	FAUNA	FLORA
Minnesota: 1.	---	---
2.	---	Adoxa moschatellina Mertensia paniculata Chrysosplenium ioense
3. * Discus catskillensis		Adoxa moschatellina Chrysosplenium ioense
4. * Discus catskillensis		*Chrysosplenium ioense
5.		
6. * Vertigo hubrichti		*Adoxa moschatellina
* V. occulta		
7. - 9.	---	---
10. * Succinea sp.		*Gymnocarpium robertianum
* Discus catskillensis		
* Vallonia gracilicosta		
* Vertigo hubrichti		
* V. occulta		
11.	---	*Gymnocarpium robertianum
12.	---	*G. robertianum
14.	---	---
15.	---	*G. robertianum
16. * Succinea sp.		*Chrysosplenium ioense
* Discus catskillensis		*Gymnocarpium robertianum
* Vertigo hubrichti		
18.	---	*Chrysosplenium ioense *Adoxa moschatellina

LOCALITY	FAUNA	FLORA
	19. * Succinea sp.	*Adoxa moschatellina
	* Discus catskillensis	
	20. * Zonitoides limatulus	
	* Discus catskillensis	
	22. --- ---	*Dodecatheon amethystinum
	28. --- ---	*Chrysosplenium ioense
		*Adoxa moschatellina
WISCONSIN	1. * Vertigo hubrichti	Carex media
	* V. occulta	*Ribes hudsonianum
		Gymnocarpium robertianum
	2. * Vertigo hubrichti	*Carex media
	3.	*Ribes hudsonianum
	4. * Vertigo hubrichti	*Aconitum noveboracense
	* V. occulta	*Carex media
		*Ribes hudsonianum
		*Gymnocarpium robertianum
	5. * Vertigo hubrichti	*Aconitum noveboracense
	* V. occulta	*Carex media
		*Ribes hudsonianum
		*Adoxa moschatellina
	6. --- ---	*Ribes hudsonianum
	7. * Vertigo hubrichti	*Aconitum noveboracense
		*Ribes hudsonianum

LOCALITY	FAUNA	FLORA
	8. * <i>Vertigo hubrichti</i>	* <i>Aconitum noveboracense</i>
	* <i>V. occulta</i>	* <i>Ribes hudsonianum</i>
14.	--- ---	--- ---
17.	--- ---	--- ---
18.	--- ---	--- ---
20.	--- ---	* <i>Aconitum noveboracense</i>

APPENDIX I

Locality list

MINNESOTA

1. Spring Valley 1. Weak Galena algific slope on NE face of high bluff, SW $\frac{1}{2}$ NE $\frac{1}{2}$ NW $\frac{1}{2}$ sec. 20, T103N R12W, Wykoff 7 $\frac{1}{2}$ ' quad.
2. Spring Valley 2. Large weak Galena algific slope on N facing bluff above creek. NW $\frac{1}{2}$ NW $\frac{1}{2}$ NW $\frac{1}{2}$ sec. 20, T103N R12W, Wykoff 7 $\frac{1}{2}$ ' quad. Few Chrysosplenium ioense; Mertensia paniculata and Adoxa moschatellina common.
3. Spring Valley 3. Small moderately strong Galena algific slope near top of bluff on W. side of gully and extending into it on the E. Center SE $\frac{1}{2}$ SE $\frac{1}{2}$ NE $\frac{1}{2}$, sec. 19, T103N R12W, Wykoff 7 $\frac{1}{2}$ ' quad. Abundant Chrysosplenium ioense in limited area; also common Mertensia paniculata and Adoxa moschatellina.
4. Spring Valley 4. Very small N-facing Galena algific slope on east side of gully across from Locality 3. SW $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ sec. 20, T103N R12W, Wykoff 7 $\frac{1}{2}$ ' quad. Few Chrysosplenium ioense.
5. Spring Valley 5. Weak Galena N-facing algific slope damaged by road building above quarry. NW $\frac{1}{2}$ NW $\frac{1}{2}$ NW $\frac{1}{2}$ sec. 16, T103N R12W, Wykoff 7 $\frac{1}{2}$ ' quad.
6. Forestville 1. Large, composite bilevel NW facing Galena algific slope in Forestville State Park above S. branch of Root River. Abundant Adoxa moschatellina, relict Vertigo spp.. NW $\frac{1}{2}$ NW $\frac{1}{2}$ SE $\frac{1}{2}$ sec. 24, T102N R12W, Greenleafon T $\frac{1}{2}$ ' quad.
7. Forestville 2. Small weak N-facing algific slope in Forestville State Park above S. branch, Root River, SW $\frac{1}{2}$ NE $\frac{1}{2}$ NE $\frac{1}{2}$ sec. 24, T102N R12W, Fountain 7 $\frac{1}{2}$ ' quad.

8. Forestville 3. Very small weak N-NE Galena algific slope in small gully in Forestville State Park, above S. branch of Root River.

NW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 24 T102N R12W, Greenleafon 7 $\frac{1}{2}$ ' quad.

9. Forestville 4. Large but weak bileveled Galena algific slope (NW facing), in Forestville State Park, above S. branch of Root River.

SW $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 24, T102N R12W, Greenleafon 7 $\frac{1}{2}$ ' quad.

10. Canfield Creek 1. Large good composite Galena algific slope above Big Spring: a) upper, in Abies stand. Good Gymnocarpium robertianum ca. 300' E of spring.

b) exposed talus and base of high bluff above and 50 - 100' E, of spring. Common large unidentified succineid.

c) stream drift at base of slope below a).

NE $\frac{1}{4}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 25, T102N R12W Greenleafon quad.

11. Canfield Creek 2. Small but intense exposed (and? pastured) algific slope on low Galena knob just above flood plain. NW $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 25, T102N R12W, Greenleafon quad. Common Gymnocarpium robertianum.

12. Canfield Creek 3. Large Galena algific slope on N. face of first tributary to north of Big Spring. NE $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 25, T102N R12W, Greenleafon quad. Common Gymnocarpium robertianum.

13. Canfield Creek 4. Stream drift at base of Galena - Prairie du Chien slope on W. side of creek. Center NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 25, T102N R12W Greenleafon quad.

14. Canfield Creek 5. Small bifurcating Galena alfigic slope up small tributary near major branch: a) North branch

b) South branch

NE $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 25, T102N R12W Breenleafon quad.

Few snails noticed alive: good B. papyrifera population.

15. Canfield Creek 6. Moderate-sized Galena algific slope above main creek. Center E $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{4}$ sec. 25, T102N R12W, Greenleafon quad. Large B. papyrifera and G. robertianum populations.
16. Root River 1. Large, complex, and steep Galena algific slope on north-facing meander of Root River. SE $\frac{1}{2}$ NW $\frac{1}{2}$ NW $\frac{1}{4}$ sec. 26, T102N R12W, Greenleafon quad. Has large Sambucus pubens and Chrysosplenium ioense populations. On wet exposed slope above talus is a small population of an unfamiliar succineid.
17. Root River 2. Drift at base of weak Galena algific slope (NW facing). Center W $\frac{1}{2}$ NE $\frac{1}{2}$ NW $\frac{1}{4}$ sec. 25, T102N R12W. Greenleafon quad.
18. Root River 3. Very large diffuse Galena algific slope on north-facing meander slope above Root River. Collected at W. end and in adjacent small tributary. Whole slope pastured, especially on W. end. Center SE $\frac{1}{2}$ sec. 23, T102N R12W, Greenleafon quad. Has small populations of Chrysosplenium ioense and Adoxa moschatellina.
19. Deer Creek. Small, weak, partly pastured algific slope, located on W. facing slope and in adjacent small tributary. NW $\frac{1}{2}$ NE $\frac{1}{2}$ NW $\frac{1}{4}$ sec. 13, T103N R13W Wykoff quad. Large Adoxa moschatelliana population.
20. Beaver Creek Valley State Park. Weak Prairie du Chien algific slope with single intensely cold vent. NW $\frac{1}{2}$ NW $\frac{1}{2}$ NW $\frac{1}{4}$ sec. 16, T102 R6W, Sheldon quad.
21. Crooked Creek. Large west-facing Prairie du Chien slope above St. Peter bluffs. Not an algific slope, but has Z. limatulus, D. catskillensis, and albino H. occulta. Sw $\frac{1}{4}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 22, T102N R5W Caledonia quad.

22. Sheldon West. Weak algific slope in Prairie du Chien at Prairie du Chien - St. Peter contact. Not collected for snails, but has large Dodecatheon amethystinum population. $S\frac{1}{2}NE\frac{1}{4}SW\frac{1}{4}$ sec. 7, T102N R7W Spring Grove quad.
24. Yucatan St. Peter slope with large Dodecatheon amethystinum population. Not collected for snails; not an algific slope. Center $S\frac{1}{2}NE\frac{1}{4}$ sec. 8, T102N R7W, Yucatan quad.
25. Coyote Point. Exposed north-facing Prairie du Chien slope at Coyote Point, Whitewater River State Park, center sec. 20, T107N R10W, Elba quad. Not an algific slope.
26. Whitewater River South. North-facing meander in Prairie du Chien, Whitewater River State Park; weak algific slope. Center $SE\frac{1}{4}SW\frac{1}{4}$ sec. 20, T107 R10W, Elba quad.
27. Whitewater River North. Extensive but very weak algific slope in Prairie du Chien on Whitewater R. to SW of campground. $SE\frac{1}{4}NE\frac{1}{4}SE\frac{1}{4}$ sec. 19, T107N R10W, Elba quad.
28. Root River 4. Large composite Galena algific slope along Root River. $NW\frac{1}{4}NW\frac{1}{4}SE\frac{1}{4}$ sec. 21, T102N R12W Cherry Grove quad. Large Chrysosplenium ioense and Adoxa moschatellina populations.
29. Root River 5. Drift along Root River near entrance to Mystery Cave
1. $NE\frac{1}{4}NE\frac{1}{4}NE\frac{1}{4}$ sec. 30, T102 R12W Cherry Grove quad.

WISCONSIN

1. Glenhaven 1. Small intense Galena algific slope in two patches along unnamed tributary. NW $\frac{1}{4}$ and NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 15, T4N R6W, Guttenberg quad.: a) North patch with abundant Ribes hudsonianum and Gymnocarpium robertianum
b) South patch - weak slope with Carex meadia
2. Glenhaven 2. Small moderately patchy Galena algific slope on unnamed tributary. SE $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 15, T4N R6W, Guttenberg quad. Good populations of Ribes hudsonianum and Carex meadia.
3. Glenhaven 3. Elongate diffuse Galena slope consisting of about nine separate patches. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 15, T4N R6W. Guttenberg quad. Small Ribes hudsonianum population and scattered white cedar (?introduced).
4. Chase Creek 1. Small perched Galena algific slope, NE-facing, on main creek. Center SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 2, T4N R6W, Guttenberg quad. Flora includes Aconitum noveboracense, Carex meadia, Ribes hudsonianum, and Gymnocarpium robertianum.
5. Chase Creek 2. Extensive Galena algific slope on unnamed tributary of Chase Creek. SE $\frac{1}{4}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 11, T4N R6W, Guttenberg quad. Flora includes Aconitum noveboracense, Carex meadia, Ribes hudsonianum, Adoxa moschatellina, and Mertensia paniculata.
6. Chase Creek 3. Small pastured weak Galena algific slope above field across secondary road. SW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 2, T4N R6W, Guttenberg quad.
7. Chase Creek 4. Small good algific slope in Galena above spring on western part of middle tributary of Chase Creek. NE $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 2, T4N R6W, Guttenberg quad. Has small Aconitum noveboracense population and larger Ribes hudsonianum.

8. Chase Creek 5. Small but relatively undisturbed Galena algific slope on eastern part of middle tributary of Chase Creek. $N\frac{1}{2}NE\frac{1}{2}SE\frac{1}{2}SE\frac{1}{2}$ sec. 2, T4N R6W, Guttenberg quad. Small Aconitum noveboracense population; good Ribes hudsonianum also noted.
9. Hay Valley. E-facing sandstone bluff (Trempeleau ss.) above Kickapoo R. Center $NE\frac{1}{2}NW\frac{1}{2}$ sec 22, T14N R2W, La Farge quad. Snails include Zonitoides limatulus.
10. Coon Valley. N-facing Trempeleau ss. bluff above Coon Creek on county road E. of Wisconsin Hwy. P. $NE\frac{1}{2}SW\frac{1}{2}$ sec. 4, T14N R5W, Viroqua B' quad. Live Discus catskillensis and Zonitoides limatulus noted.
11. Parfrey's Glen. N-facing Prairie du Chien - St. Peter ss. bluff at Parfrey's Glen State Preserve, $SW\frac{1}{2}$ sec. 23, T11N R10E, Saule Co. Small previously-reported Aconitum noveboracense population.
12. Lodde's Mill Bluff. N-facing ss bluff above Honey Creek, $NE\frac{1}{2}NW\frac{1}{2}$ sec. 17, T9N R6E, Sauk Co., Small previously reported Aconitum noveboracense population.
13. Muddy Creek North. N-facing slope (not now algific) on N tributary of Muddy Creek on county road VV. $SE\frac{1}{2}SW\frac{1}{2}NE\frac{1}{2}$ sec. 2, T4N R6W. Guttenberg quad. Pastured-out former algific slope.
14. Muddy Creek South. Large pastured N-facing Galena algific slope on main branch of Muddy Creek. $NW\frac{1}{2}SW\frac{1}{2}NW\frac{1}{2}$ sec. 12, T4N R6W, Guttenberg quad.
15. Dodgeville NE. NE-facing Platteville slope on south tributary of Spring Green Creek. $SW\frac{1}{2}SW\frac{1}{2}NE\frac{1}{2}$ sec. 20, T6N R4E, Jonedale quad. Not an algific slope.
16. Sandy Creek. N-facing Galena slope above Sandy Creek. Not an algific slope. $NE\frac{1}{2}SW\frac{1}{2}SW\frac{1}{2}$ sec. 27, T5N R6W, Bagley quad.

17. McCartney Branch. N-facing weak Galena slope above McCartney Branch. Center NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 33, T3N R4W Balltown quad. No unusual flora or fauna.
18. Burton. Heavy pastured N-facing weak Galena algific slope on Grant River SE of Benton, SE $\frac{1}{4}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 25, T3N R4W, Balltown quad.
19. Pine Knob. Dry N-facing Prairie du Chien slope on main branch of Warner Creek. NE $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 1, T6N R5W Wauzeka quad.
20. Chase Creek 6. Small, heavily pastured Galena algific slope on south tributary of Chase Creek. NE $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 11, T4N R6W, Guttenberg quad. Has very small Aconitum noveboracense population. Snails almost completely trampled out.

APPENDIX II Faunal lists

MINNESOTA

4. Spring Valley 4: *Triodopsis albolaberis*
Hendersonia occulta
Anguispira alternata
Discus catskillensis
Euconulus fulvus
Strobilops labyrinthica
S. l. virgo
Carychium exiguum
Punctum minutissimum
6. Forestville 1: *Triodopsis albolabris*
Hendersonia occulta
Discus catskillensis
Euconulus fulvus
Vertigo hubrichti
V. occulti
Gastrocopta holzingeri
Carychium exiguum
Punctum minutissimum
10. Canfield Creek 1.(b) west end:
Allogona profunda
Anguispira alternata
Succinea sp.
Hendersonia occulta
Discus catskillensis
Vallonia gracilicosta
V. pulchellum
Helicodiscus parallelus
Strobilops labyrinthica
S. l. virgo
Gastrocopta contracta
G. holzingeri
Hawaiiia minuscula
Vertigo tridentata
V. hubrichti
V. gouldi
Euconulus fulvus
Carychium exiguum
Punctum minutissimum
16. Root River 1.(a) *Chrysosplenium patch*
Hendersonia occulta
Cochlicopa lubrica
Anguispira alternata
Succinea sp.
Discus catskillensis
Columella edentula
Gastrocopta contracta

Strobilops labyrinthica
Hawaiiia minuscula
Hebiodiscus parallelus
Zonitoides arboreus
Euconulus fulvus
Vertigo hubrichti
V. gouldi
Carychium exiguum
Punctum minutissimum

(b) Cliff with succineid colony:

Succinea sp.
Deroceras laeve
Vertigo hibrichti
Punctum minutissimum
Carychium exiguum

25. Coyote Point:

Anguispira alternata
Cochlicopa lubrica
Stenotrema fraternum
Zonitoides arboreus
Retinella indentata
Euconulus fulcrus
Strobilops labyrinthica
Gastrocopta armifera
G. contracta
G. corticaria
G. holzingeri
Vertigo gouldi
Vallovia parvula
Hawaiiia minuscula
Striatura milium
Punctum minutissimum

WISCONSIN

1. Glenhaven 1:

Triodopsis albolabris
Hendersonia occulta
Zonitoides arboreus
Strobilops labyrinthica
S. l. virgo
S. affinis
Vallonia parvula
Columella edentula
Gastrocopta armifera
G. contracta
G. pentodon
G. holzingeri
Striatura milium
Vertigo hubrichti
V. occulta
Carychium exiguum
Punctum minutissimum

2. Glenhaven 2:

Hendersonia occulta

Zonitoides arboreus
 Gastrocopta contracta
 G. corticaria
 G. pentodon
 G. holzingeri
 Striatura milium
 Vertigo hubrichti
 Carychium exiguum
 Punctum minutissimum

4. Chase Creek 1:

Hendersonia occulta
 Stenotrema barbatum
 Retinella electrina
 Zonitoidea arboreus
 Hawaia minuscula
 Euconulus fulvus
 Strobilops labyrinthica
 S. l. virgo
 Columella edentula
 Striatura milium
 Gastrocopta contracta
 G. holzingeri
 G. pentodon
 Vertigo hubrichti
 V. occulta
 Carychium exiguum
 Punctum minutissimum

5. Chase Creek 2:

Triodopsis albolabris
 Hendersonia occulta
 Retinella electrina
 Zonitoides arboreus
 Hawaia minuscula
 Striatura milium
 Strobilops labyrinthica
 Euconulus fulvus
 Gastrocopta contracta
 G. pentodon
 G. holzingeri
 Vertigo hubrichti

7. Chase Creek 4:

Allogona profunda
 Hendersonia occulta
 Cochlicopa lubrica
 Euconulus fulvus
 Strobilops labyrinthica
 Columella edentula
 Gastrocopta contracta
 G. corticaria
 G. holzingeri
 G. pentodon
 Vertigo tridentata
 V. hubrichti
 Carychium exiguum
 Punctum minutissimum

8. Chase Creek 5:

Hendersonia occulta
Euconulus fulvus
Gastrocopta holzingeri
Vertigo tridentata
V. hubrichti
V. occulti
Carychium exiguum
Punctum minutissimum

20. Chase Creek 6:

Hendersonia occulta
Zonitoides arboreus
Retinella electrina
Euconulus fulvus
Strobilops labryinthica
Gastrocopta holzingeri
Carychium exiguum
Punctum minutissimum