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Establishment
report for
exclosure studies
of *Arabis fecunda*

ESTABLISHMENT REPORT FOR
EXCLOSURE STUDIES
OF Arabis fecunda
BUREAU OF LAND MANAGEMENT
BUTTE DISTRICT

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TABLE OF CONTENTS

	PAGE
INTRODUCTION.....	1
STUDY SITES.....	1
METHODS.....	2
RESULTS AND DISCUSSION.....	2
LITERATURE CITED.....	6

INTRODUCTION

Arabis fecunda is a rosette-forming perennial in the mustard family (Brassicaceae). Endemic to southwestern Montana (Ravalli, Silver Bow and Beaverhead counties), this recently described species (Rollins 1984) is currently known from a total of only fourteen locations. Arabis fecunda populations are restricted to light-colored calcareous soils derived from metamorphosed calc-silicate parent materials (Presley 1971, Richards and Pardee 1925). These sites are found along small to large drainages at the edges of mountain uplifts (Pioneer, Sapphire, and Highland mountains, Montana), where parent materials have been exposed by erosion.

Livestock grazing and encroachment by knapweed (Centaurea maculosa) have been a suspected threat to populations of A. fecunda (Lesica 1991, Lesica and Shelly 1988). These studies hypothesized that the effects of grazing on A. fecunda were indirect through disturbance of soil crusts, and subsequent loss of plants. Long-term demographic studies have provided some information on these hypotheses (Lesica 1985, 1991, Schassberger 1988), but actual exclusion of grazers was not attempted. Although the trampling associated with grazing may be detrimental to populations, grazing may also benefit A. fecunda populations via a reduction of competing vegetation. This report documents the establishment of exclosures to study the effects of the elimination of grazing by large herbivores on portions of A. fecunda populations at two sites on the on Bureau of Land Management lands, Butte District, Headwaters and Dillon resource areas. First year data obtained from these sites are included here.

STUDY SITES

The locations and geographic details for the two study sites, in Beaverhead and Silver Bow counties, are as follows:

Quartz Hill Gulch: From Dewey, Montana, travel west on State Highway 43 ca. 0.33 miles, turning south on Quartz Hill Gulch road (Beaverhead National Forest road # 187). Drive approximately one mile up road and park on east side of road. Exclosure is on open steep hillside west of road as marked in Figure 1, p. 3. Pins were driven into the ground at the four corners of the covered exclosure and the outside corners of the adjacent control plot.

Township 1S Range 10W Section 8, NW $\frac{1}{4}$ SE $\frac{1}{4}$

Aspect: 95°

Thompson's Corner: From Dewey, Montana, travel west on State Highway 43 ca. 3.2 miles, turning north on the Jerry

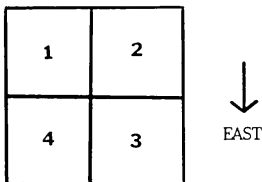
Creek road (Beaverhead National Forest road # 83). Drive approximately 0.25 miles, then turn east on a small dirt road that parallels the Big Hole River. Walk or drive ca. 2.0 miles east on this road. Site is north of the road on the west side of a small draw as marked in Figure 1, p. 3. Pins were driven into the ground at the four corners of the covered enclosure, and the outside corners of the adjacent control plot.

Township 1S Range 10W Section 5, NW $\frac{1}{4}$ NW $\frac{1}{4}$

Aspect: 100°

METHODS

The two study sites were established on 11 June 1991. At each site, four metal stakes were driven in at the corners of the enclosure (approximately 6 ft x 6 ft). A long tape measure and several yard sticks were used to divide each plot into four subplots as illustrated below.



Within each subplot, the number of rosettes, and the number of flowering and fruiting plants were tallied. In addition, the percent cover of the dominant associated plants, and in one case, rocks, was also recorded. These same methods were used to obtain data from control plots.

RESULTS AND DISCUSSION

A summary of the 1991 population data and percent cover of vegetation and rock from the Quartz Hill and Thompson's Corner plots are presented in Tables 1 & 2, p. 4 and 5, respectively. The Quartz Hill Gulch site had a higher density of A. fecunda plants and lower total vegetation cover than the sample plot at Thompson's Corner as reflected by the enclosure and control totals for each site. The lower density of A. fecunda plants at Thompson's Corner is likely due to site characteristics (i.e. the cover of rock was quite high) rather than other factors.

Arabis fecunda MONITORING PLOTS AT QUARTZ HILL GULCH

EXCLOSURE

NO. OF <u>Arabis fecunda</u> PLANTS		PERCENT COVER OF VEGETATION AND ROCKS				
PLOT NO.	NO. FLOWERING GRAMINOID ROSETTE PLANTS	NO. FRUITING PLANTS	TOTAL NO. PLANTS	ARTFRI	CHRNAU	CHRVIS
1	17	7	24	5	5	0
2	4	6	10	<5	0	0
3	9	5	14	<5	0	0
4	<u>20</u>	<u>6</u>	<u>35</u>	<5	0	<5
Total	59	24	83			

CONTROL

NO. OF <u>Arabis fecunda</u> PLANTS		PERCENT COVER OF VEGETATION AND ROCKS							
PLOT NO.	NO. FLOWERING ROSETTE PLANTS	NO. FRUITING PLANTS	TOTAL NO. PLANTS	ARTFRI	HAPACA	CHRNAU	CHRVIS	ARTDRA	GRAMINOID
1	13	2	15	0	0	0	<5	<5	5-10
2	9	1	10	0	5-10	<5	<5	0	<5
3	6	0	6	<5	0	0	<5	0	<5
4	<u>27</u>	<u>1</u>	<u>28</u>	<5	0	0	<5	0	<5
Total	55	4	59						

ARTFRI = Artemisia frigida
HAPACA = Haplopappus acaulis
CHRNAU = Chrysothamnus nauseosus
CHRVIS = Chrysothamnus viscidiflorus
ARTDRA = Artemisia dracunculus

TABLE 1. Number and phenotypic state of Arabis fecunda plants present, and percent cover of other vegetation and rocks within the enclosure and control plots at Quartz Hill Gulch.

Arabis fecunda MONITORING PLOTS AT THOMPSON'S CORNER

EXCLOSURE

NO. OF <u>Arabis fecunda</u> PLANTS		PERCENT COVER OF VEGETATION AND ROCKS					
PLOT NO.	NO. FLOWERING FRUITING PLANTS	TOTAL NO. PLANTS	ARTFRI	HAPACA	GRAMINOID	OTHER VEGETATION	ROCKS
1	4	5	5-10	<5	10-20	<5	45
2	1	4	5-10	0	5-10	0	60
3	4	9	<5	0	5-10	0	45
4	2	8	<5	<5	5-10	<5	40
Total	11	26					

CONTROL

NO. OF <u>Arabis fecunda</u> PLANTS		PERCENT COVER OF VEGETATION AND ROCKS					
PLOT NO.	NO. FLOWERING FRUITING PLANTS	TOTAL NO. PLANTS	ARTFRI	CERLED	GRAMINOID	OTHER VEGETATION	ROCKS
1	1	6	0	<5	5-10	5-10	35
2	6	14	0	<5	5-10	5-10	35
3	2	2	<5	<5	<5	5-10	25
4	1	3	<5	0	10-15	<5	40
Total	10	15					

ARTFRI = Artemisia frigida
 CHRVIS = Chrysothamnus viscidiflorus
 HAPACA = Haploappus acutis
 CHRNAU = Chrysothamnus nauseosus
 CERLED = Cercocarpus ledifolius

TAB. 2. Number and phenotypic state of Arabis fecunda plants present, and percent cover of vegetation and rocks within the enclosure and control plots at Thompson's Corner.

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