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**A COMPARATIVE STUDY OF RIPARIAN VEGETATION  
IN TWO DRAINAGE AREAS OF THE BLACK HILLS**

BY

**KRIS J. THORESON**

**A thesis submitted in partial fulfillment  
of the requirements for the degree  
Master of Science  
Major in Biology**

**South Dakota State University  
1988**

A COMPARATIVE STUDY OF RIPARIAN VEGETATION  
IN TWO DRAINAGE AREAS OF THE BLACK HILLS

This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable for meeting the thesis requirements for the degree. Acceptance of this thesis does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Signature

Date

Signature

Dr. G.A. Myers \_\_\_\_\_ Date

Signature

Major Advisor \_\_\_\_\_

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Dr. Gary Larson \_\_\_\_\_

Date

Thesis Advisor

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## INTRODUCTION

In recent years riparian or streamside habitats have received a great deal of attention by field scientists and ecologists. Considerable research has been conducted to determine the effects of grazing, mining, road building, logging, and recreation in riparian areas. The reason for this attention is the fact that riparian areas are extremely productive for livestock, wildlife, and fish (Skovlin 1984). As much information as possible needs to be collected about riparian areas so they may be effectively managed.

This study was conducted to characterize the vegetation associated with two riparian areas of the Black Hills of South Dakota. The geographical focus of the project was on two distinct drainages in the Black Hills -- the Rapid Creek and the Battle Creek drainage areas. Research was conducted to fulfill two objectives:

1. Determine how Black Hills riparian vegetation changes with variation in elevation, and
2. Evaluate differences between dominant vegetation of the Rapid Creek and the Battle Creek drainage areas.

Results of the study provide a comparison of plant diversity and species composition in relatively undisturbed riparian areas. Such information will assist resource

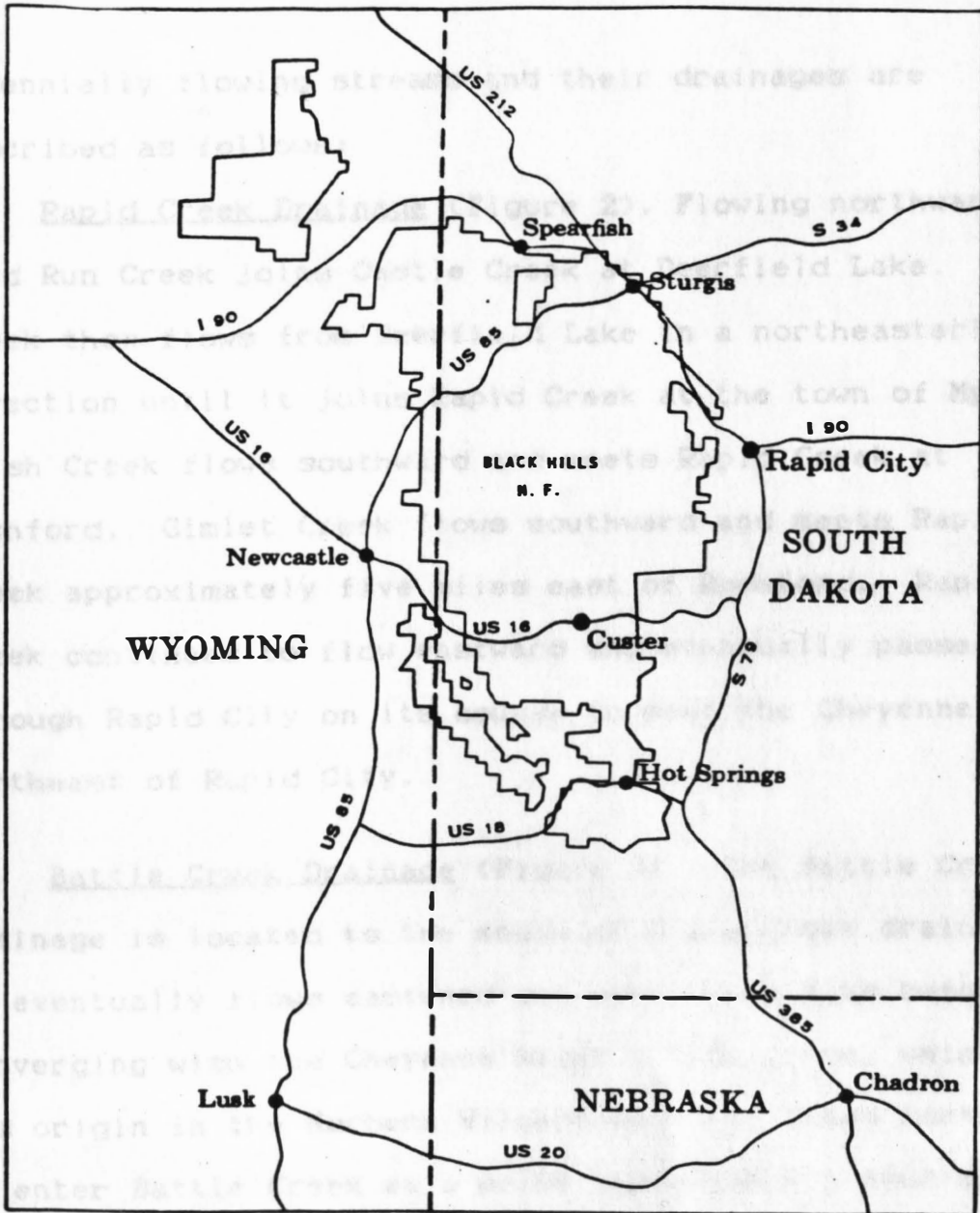
managers in effectively managing these important resource areas. In addition, it is hoped that the information will influence future policy direction by those entrusted with decisions shaping Black Hills resource utilization.

### Location and Geology of the Black Hills

The Black Hills are an isolated and unique group of mountains that rise above the plains of western South Dakota and eastern Wyoming (Fig. 1) Totaling approximately 3.3 million acres in size, the Black Hills National Forest lies primarily within the boundaries of the Black Hills.

Approximately two-thirds of the area is located in South Dakota while one-third is in Wyoming (Everson & Thilenius 1976). The Black Hills uplift is oblong in shape, approximately 120 miles from north to south and approximately 45 miles from east to west. The dome shaped mountain mass rises approximately 3,000 to 4,000 feet above the surrounding plains of South Dakota and Wyoming and reaches a maximum height of 7,242 feet above sea level at Harney Peak (Froiland 1978).

Numerous small streams and creeks drain the Black Hills. The majority of these streams flow to the north or east (Froiland 1978). The creeks that are of interest for this project include Rapid Creek, and Battle Creek along with their respective tributaries. Both creeks are



**Figure 1.** The Black Hills region of western South Dakota and eastern Wyoming (National Forest Service Map).  
Scale: 1 cm = 7 km

perennially flowing streams and their drainages are described as follows:

Rapid Creek Drainage (Figure 2). Flowing northward, Gold Run Creek joins Castle Creek at Deerfield Lake. Castle Creek then flows from Deerfield Lake in a northeasterly direction until it joins Rapid Creek at the town of Mystic. Irish Creek flows southward and meets Rapid Creek at Rochford. Gimlet Creek flows southward and meets Rapid Creek approximately five miles east of Rochford. Rapid Creek continues to flow eastward and eventually passes through Rapid City on its course to meet the Cheyenne River northeast of Rapid City.

Battle Creek Drainage (Figure 3). The Battle Creek drainage is located to the south of Rapid Creek drainage and it eventually flows eastward out onto the plains before converging with the Cheyenne River. Pine Creek, which has its origin in the Norbeck Wilderness Area, flows northeast to enter Battle Creek at a point approximately four miles west of Keystone. Grizzly Bear Creek flows in a northeast direction and enters Battle Creek near Keystone. Flowing in a northeast direction is Iron Creek which originates near the Needles and enters Battle Creek three miles southeast of Keystone. Entering from the north is Teepee Creek which joins Battle Creek near Hayward.

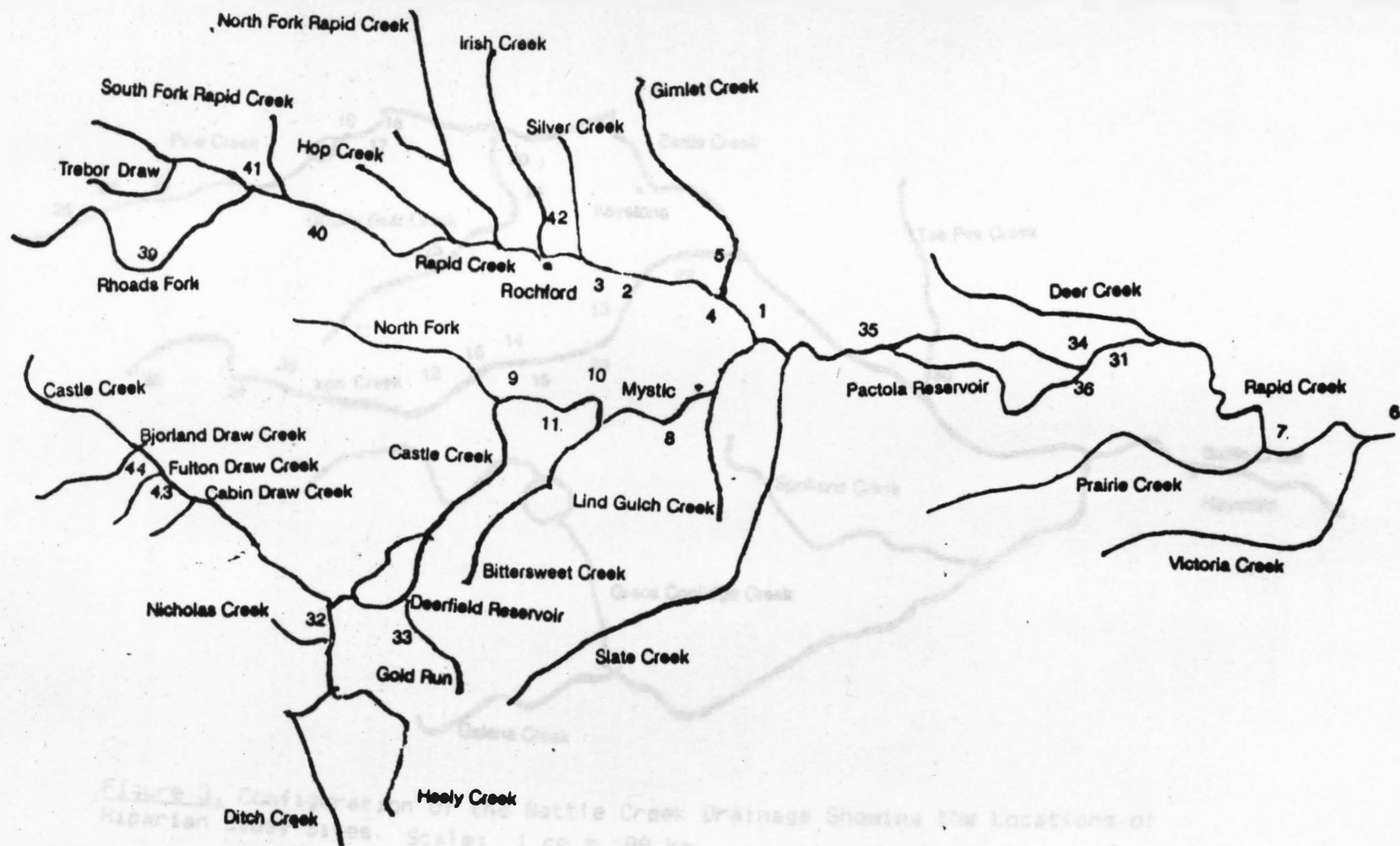
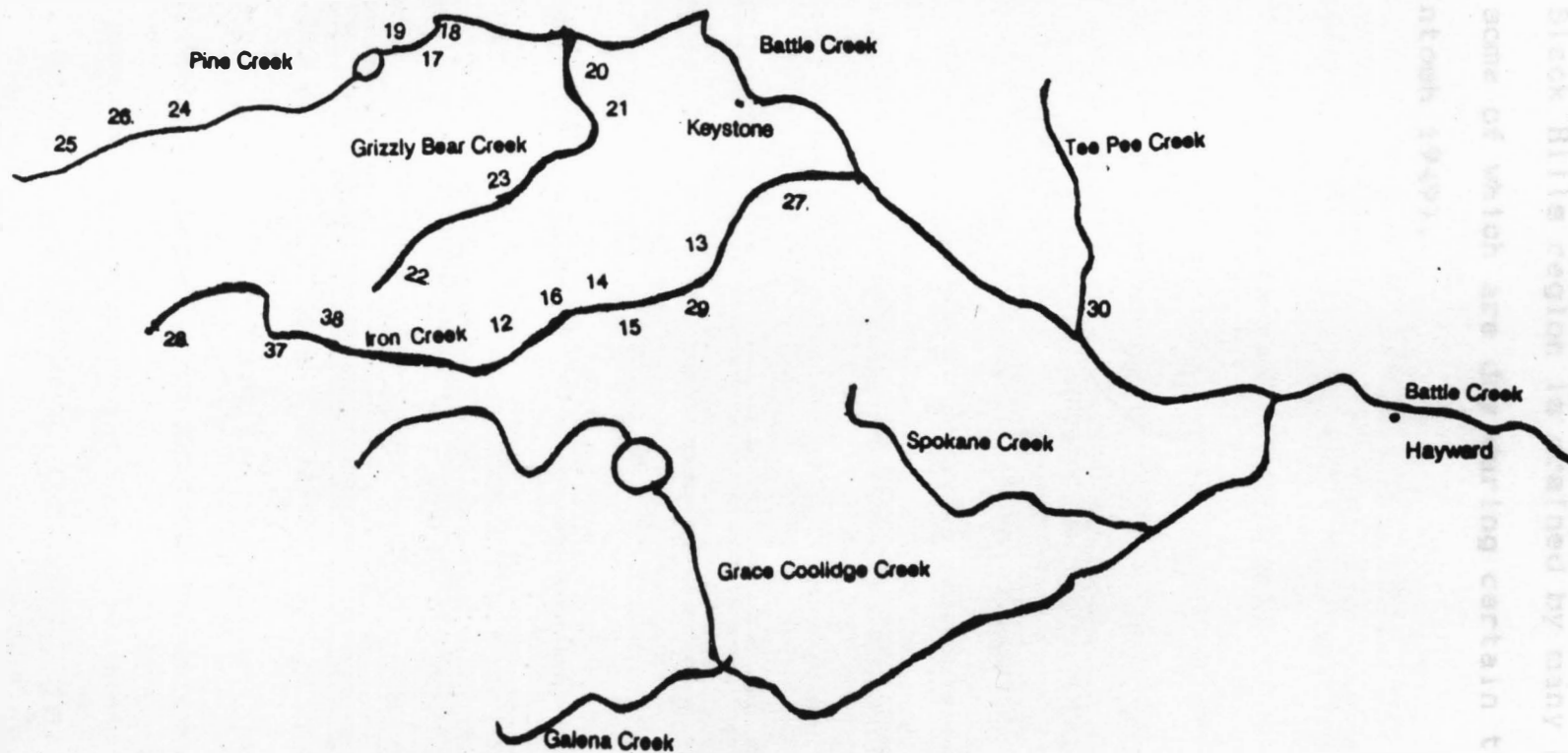


Figure 2. Configuration of the Rapid Creek Drainage Showing the Locations of Riparian Study Sites. Scale: 1 cm = 1.6 km



**Figure 3.** Configuration of the Battle Creek Drainage Showing the Locations of Riparian Study Sites. Scale: 1 cm = .80 km

The Black Hills region is drained by many other stream systems, some of which are dry during certain times of the year (McIntosh 1949).

Due to the fact that certain stream systems are not always active, it is rather difficult to determine a general picture of the drainage pattern of the Black Hills region. This is especially true in the case of the Black Hills region, where the drainage pattern is highly variable and changes frequently. The drainage pattern of the Black Hills region is highly variable and changes frequently. The drainage pattern of the Black Hills region is highly variable and changes frequently.

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## LITERATURE REVIEW

### Characteristics of Riparian Areas

Due to the fact that riparian areas can be described in so many different ways, it is rather difficult to provide a narrow definition of riparian habitat that will be applicable to all situations. In a broad sense however, riparian habitat can be characterized as any habitat that is related to a river or water course (Webster 1971).

Platts (1987) and Anderson (1985) define riparian habitats in physical terms by stating that riparian systems are to include those areas found between the stream edge and the lower boundary of upland slopes. Such a definition implies that the size, shape, and structure of a riparian area is dependent upon landform and could thus include much area quite removed from a stream or river.

One may also define a riparian ecosystem on the basis of biotic factors. The zone of interaction between aquatic and terrestrial environments, for example, would also be considered riparian (Swanson et al. 1982). This definition acknowledges the notion that riparian habitat can be defined based on the plant communities and hydrology. Swanson et al. (1982) offer a very strict definition of riparian habitat by confining riparian areas to the streams edge. Most essential to development of a riparian habitat is the



presence and effect of flowing water. One can define a riparian area as being any area in which the presence of certain plants, animals, and aquatic species is either directly or indirectly linked to streams with flowing water (Kauffman and Krueger 1984).

Characteristic of most riparian areas is a well-defined vegetation structure within drier surroundings, constituting a minor proportion of total land area; they are more productive than surrounding areas, and they provide a source of habitat diversity for the landscape (Thomas 1979, cf Kauffman and Krueger 1980). Clearly, all riparian areas have certain characteristics in common. For the purpose of this paper, any reference to riparian habitat will pertain to areas adjacent to a creek.

### Ecology of Riparian Areas

Within the last twenty years scientists have spent a great deal of time researching the importance of riparian areas to the ecosystems in which they are found. In most mountainous regions of the West, riparian areas constitute only one to two percent of the total land area (Anderson 1985), yet this small land area is crucial to the maintenance of total ecosystems thanks to the high productivity and diversity of riparian habitats. Protection from the high winds, protection from temperature extremes in

the summer and winter, and greater water availability are major factors that make riparian areas more productive and diverse than surrounding land (Swanson et al. 1982).

A variety of life forms benefit greatly from riparian areas. The importance of riparian areas to fish (Swift and Messer 1971, Stuber 1985), waterfowl (Kantrud 1986), small mammals (Cross 1985), and big game (Skovlin 1984) populations has been well documented. Riparian vegetation supports wildlife populations by providing food, nesting cover, thermal cover, and hiding cover. Not only is riparian vegetation productive for wildlife, but also for cattle. Skovlin (1984) maintains that riparian area can support more cattle per acre than any other range type.

The vegetation found within a riparian community also contributes to maintaining the quality of a stream flowing through it. During times of flood, riparian vegetation slows the velocity of water, reducing erosion of the stream bank and allowing more water to soak into the soil (Anderson 1985, Kauffman and Krueger 1984). Platts and Rinne (1985) have observed that grass growing along a creek will actually form a mat during flooding, forcing water up and over the grass. Campbell (1970) has also shown that a reduction or removal of riparian vegetation can increase the flow of

water into a streambed with the potential result of increased flood damage.

Not only is riparian vegetation useful in reducing erosion and siltation in a stream, but it also helps stabilize water temperature in small streams in particular. Removal of streamside vegetation exposes a stream to direct solar radiation. In some streams a maximum increase of 18° F has been recorded due to the removal of overhanging riparian vegetation (Brown and Krygier 1970). During the winter months streamside vegetation helps protect flowing waters from becoming too cold or freezing. Thus, overhanging vegetation helps reduce extreme fluctuations in temperature that might occur from summer to winter (Platt and Rinne 1985). The amount of bordering vegetation will also influence the amount of dead organic matter a stream receives, its level of primary production, and the activity of invertebrates. All of these factors could have an effect on fish populations (Knight and Bottoroff 1981). Swift and Messer (1971) have found that removal of riparian vegetation from small streams reduces trout production and that elevated water temperatures of over 77.5°F resulting from vegetation removal are fatal to trout. Stuber (1985) states that when stream bank vegetation is protected, there is a

96.5% increase in game fish populations in some areas, with a corresponding reduction in rough fish populations.

An important aspect of the high productivity of riparian areas is in its influence on the amount of organic matter a stream receives from the bordering vegetation. It has been found that up to ninety percent of the organic matter needed to support high elevation stream communities comes from adjacent riparian vegetation (Cummins and Spengler 1978, c.f. Kauffman and Krueger 1984). Organic matter enters a creek in the form of leaves, twigs, branches, logs, fruits and buds, all of which contribute energy to support invertebrate populations in the stream ecosystem (Knight and Bottorff 1981).

The importance of riparian vegetation in providing wildlife habitat, protecting stream banks from erosion and stream channels from siltation, moderating water temperature in creeks, providing energy to aquatic ecosystems and forage for domestic cattle and big game animals is disproportionate to the relatively small land area occupied by riparian plant communities. Hence, the importance of riparian vegetation to stream life, plant life, wildlife and ultimately to human life cannot be overestimated.

classification of vegetation in the Black Hills White Pine

### Black Hills Riparian Vegetation

The Black Hills region has often been described as a "forested island within a grassland sea" and, because of its uniqueness, the flora has been closely studied by a number of researchers. Notes describing vegetation characteristics of the Black Hills go as far back as 1823 when a member of the Jedediah Smith party briefly described the presence of a petrified forest (Froiland 1978).

From the early 1900's to more recent times several significant works have been authored. Hayward (1928) presents an outline of plant communities in the Black Hills and lists over 800 species. A more comprehensive taxonomic survey of the Black Hills is also provided by McIntosh (1949). Pase and Thilenius (1968) reported on the grasslands of the Black Hills in a comparison between grazed and ungrazed areas. Thilenius (1971) also produced a revision of the results disclosed by McIntosh (1949).

The value of Black Hills vegetation to deer and cattle has been investigated by Kranze and Linder (1973) while Severson and Thilenius (1976) have provided a classification of Quaking Aspen stands. More recently Hoffman and Alexander (1987) have published a habitat type classification of vegetation in the Black Hills while Dorn

(1977) published a taxonomic key to the flora of the Black Hills.

Despite the fact that the vegetation of the Black Hills has been well studied, few researchers have specifically studied vegetation within the riparian zones. Hayward (1928) in his study of the Black Hills flora describes what he refers to as a streamside stage consisting primarily of Betula and Salix species. The 64 species listed by Hayward as streamside associated are shown in Table 1 which follows.

**Table 1.** Plant species described by Hayward (1928) as being streamside (riparian) species. (Synonyms using Hayward's nomenclature are in parenthesis)

<u>Tree Species</u>	<u>Herbaceous (cont.)</u>
Populus angustifolia	Carex nebraskensis
Populus acuminata	Carex rostrata
Populus deltoides	Carex stipata
Quercus macrocarpa	Ranunculus longirostris
Ulmus americana	(Batrachium tri-
	chophyllum)
Fraxinus pennsylvanica	Ranunculus cymbalaria
Prunus virginiana	Callitriche palustris
	Lysimachia ciliata
	(Steironema ciliatum)
	Veronica americana
	Lysimachia ciliata
	Habenaria hyperborea
	(Limnorchis hyperborea)
	Actaea rubra
	(A. arguta)
	Ranunculus macounii
	Heuchera richardsonii
	Vicia americana
	Viola canadensis
	Sanicula marilandica
	Zizia aptera
	(Z. cordata)
	Pyrola asarifolia
	Moneses uniflora
	Gentianella amarella
	(Gentiana strictiflora)
	Prunella vulgaris
	Stachys palustris
	Castilleja sulphurea
	Galium triflorum
	Linnaea borealis
	(L. americana)
	Calamagrostis
	canadensis
	Eleocharis glaucescens
	Juncus ensifolium
	Juncus saximontanus
<u>Shrub Species</u>	
Betula occidentalis	
(B. fontinalis)	
Salix bebbiana	
Salix scouleriana	
Salix lasiandra	
(S. fendleriana)	
Salix exigua subsp. interior	
(S. fluviatilis)	
Salix balsamifera	
Cornus stolonifera	
Cornus sericea	
(C. baileyi)	
Corylus rostrata	
Amelanchier alnifolia	
(A. oreophila)	
Rosa woodsii	
Ribes inerme	
Rubus pubescens	
(R. americana)	
<u>Herbaceous Species</u>	
Equisetum arvense	
Equisetum laevigatum	
Potamogeton gramineus	
(P. heterophyllum)	
Potamogeton pectinatus	
Triglochin palustris	
Aleopecurus aequalis	
Glyceria striata	
(Panicularia nervata)	
Scirpus microcarpus	
Carex aurea	
Carex disperma	
Carex lanuginosa	

The other significant work that devotes attention to riparian vegetation is that of McIntosh (1949). McIntosh describes a streamside stage of plant growth as well as a sedge-moor stage. The species identified by McIntosh are shown in Table 2.

**Table 2.** Plant species described by McIntosh (1949) as streamside species (Synonyms using McIntosh's nomenclature are in parenthesis)

---

Tree Species

*Populus balsamifera*  
(*P. tacamahaca*)  
*Populus deltoides*  
(*P. sargentii*)  
(subspecies *monolifera*)  
*Populus acuminatalia*  
*Populus angustifolia*  
*Salix amygdaloides*

Shrubs

*Salix exigua*  
(*S. interior*)  
*Salix lutea*  
*Salix bebbiana*  
*Salix petiolaris*  
*Salix planifolia*  
*Salix pseudomonticola*  
*Salix scouleriana*  
*Salix discolor*  
(*S. prinoides*)  
*Salix lasiandra*  
(*S. fendleriana*)  
*Corylus cornuta*  
*Ribes* spp.  
*Sambucus* spp.  
*Clematis ligusticifolia*  
*Vitis riparia*

Herb Species (cont)

*Actaea rubra*  
*Ranunculus macounii*  
*Vicia americana*  
*Epilobium* spp.  
*Heracleum sphondylium*  
*Cicuta douglasii*  
*Lysimachia ciliata*  
(*Steironema ciliatum*)  
*Agastache foeniculum*  
*Stachys palustristatum*  
*Mentha arvensis*  
(*Mentha canadensis*)  
*Eupatorium maculatum*  
*Aster novae-angliae*  
*Rudbeckia laciniata*  
*Carex nebraskensis*  
*Carex rostrata*  
*Mimulus guttatus*  
*Veronica americana*  
*Echinocystis lobata*  
*Phleum pratense*  
*Phalaris arundinacea*  
*Glyceria grandis*  
*Glyceria striata*  
(*G. nervata*)

---

Herbaceous Species

*Equisetum arvense*  
*Equisetum laevigatum*  
*Urtica dioica*

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### Elevation and Riparian Vegetation in the Black Hills

In literature on riparian vegetation, occasional discussion is made concerning the effect of elevation on the distribution of riparian species. Hayward (1928) in his research of plants in the Black Hills distinguishes among tree and shrub species that occur in the upper and lower levels of the Black Hills. Hayward states that four dominant shrub species exist in the upper Black Hills. These species include Betula occidentalis (B. fontinalis), Salix bebbiana, S. scouleriana and S. lasiandra (S. fendleriana). It should be noted that reports of S. lasiandra for the Black Hills are apparently in error. Since more recent studies of Black Hill's willows (Froiland 1962) have not detected this species. Other species intermixed with the four dominants are Salix exigua (including S. fluviatilis), Cornus stolonifera, (including C. baileyi), Prunus virginiana (P. melanocarpa), Corylus rostrata, Amelanchier alnifolia (including Amelanchier oreophila), Rosa woodsii, Ribes inerme, and Rubus pubescens (R. americanus). At lower elevations the dominant shrubs are replaced by the trees Populus angustifolia, Populus acuminata, and Populus deltoides subspecies monilifera (P. sargentii). Willow species present at lower elevations include: Salix bebbiana, S. lasiandra (S. fendleriana), S.

pyrifolia, (S. balsamifera), S. fluviatilis, and S. lutea. Hayward's attribution of S. pyrifolia to the Black Hills is apparently based on a misidentification because like S. lasiandra, the plant has not been detected by more recent studies. Other trees present at lower elevations include Quercus macrocarpa, Acer negundo and Ulmus americana which Hayward indicates is evidence of a gradual transition to deciduous forest as elevation declines.

McIntosh (1949) also mentions the variations in plant communities with changes in altitude in a very general manner. According to McIntosh those woody species found at the higher elevations include the paper birch Betula papyrifera, Salix bebbiana, S. petiolaris, S. planifolia, S. pseudomonticola, S. scouleriana, S. discolor (S. prinoides using McIntosh's nomenclature), and S. lasiandra (S. fendleriana), Populus tremuloides and P. balsamifera (P. tacamahaca). On the other hand, low elevation species include a variety of cottonwoods such as Populus deltoides, subspecies monilifera, (P. sargentii), P. acuminata, and P. angustifolia.

Willows that prevail at the low altitudes according to McIntosh are Salix amygdaloides, S. exigua (S. interior), and S. lutea. Neither Hayward (1928) nor McIntosh (1949) describe the distributions of herbaceous plants relative to

variation in elevation. It is interesting to note that both of these observers commented on the luxuriant shrub growth that occurred along the Black Hills creeks, often so dense that the stream itself was obstructed from view.

As one may expect, many environmental factors other than elevation affect plant growth. Pase and Thilenius (1968) describe the additional importance of precipitation, soil depth, and soil parent material in determining plant distribution. Hoffman (1984) emphasizes the role that slope and exposure can play in determining the type of vegetation that inhabits a certain area, saying that these two factors may compensate for any changes that occur in elevation, moisture or temperature gradients. The relative position of riparian vegetation to moving water plays a role in determining which species will be present at any given site (Hupp and Osterkamp 1985). Reichenbacher (1984) has shown that moving water creates an unstable substrate for plant growth, thus favoring the growth of aggressive colonizers such as members of the Populus and Salix genera.

Other recent studies in the Black Hills have dealt with classifying plant communities according to habitat types. In classifying vegetation by habitat types, the dominant climax overstory species is always listed along with one or more associated understory species that have very narrow

requirements for growth (Alexander 1986). Severson and Thilenius (1976) in a habitat type classification of aspen stands, note that aspen is found primarily on north facing slopes and only between 4,000 and 7,000 feet in elevation. They also list Salix bebbiana, Cornus stolonifera, and Betula occidentalis as existing primarily in higher elevations in the Black Hills.

Thilenius (1972) in his classification of deer habitat in the Black Hills describes a Pinus ponderosa/Prunus virginiana/Amelanchier alnifolia/Galium triflorum habitat type in what he considers to be a semi-riparian site at an elevation of 5200 feet.

In determining why certain plants exist where they do it becomes clear that one must not only consider the effects of elevation, but also take into account the effects of slope, exposure, precipitation, water table depth, soil type, soil depth, temperature, disturbance by water, livestock and man.

## METHODS AND MATERIALS

### Site Selection

Study sites were selected in natural riparian areas that were considered to be relatively free of disturbance. Such disturbances would include fire, mining, grazing by livestock, logging and recreation. The sites selected fulfilled these requirements and also supported vegetation at or near biotic potential relative to the prevailing conditions. Figures 2 and 3 show the location of study sites within the Rapid and Battle Creek drainages and descriptions of site locations are given in Appendix I.

Study sites were positioned along the creek channel so that sample plots ran parallel to land contours and not across them. By locating the plots along the land contours, the chance of having more than one plant community type within the plot was minimized (Daubenmire 1959).

Orange and white one centimeter diameter steel rods were placed on the north or east side of each plot on the corner closest to the creek for future reference. As many undisturbed plant community types as possible were sampled along each creek.

### Vegetation Sampling the Daubenmire microplot method

Sample plot sizes were 6.7 X 30.3 m or 200 m<sup>2</sup> in area. Some plots were of different dimensions to assure the homogeneity of the vegetation within the plot while the 200 m<sup>2</sup> area of the plot remained constant. Daubenmire (1959) stated that quantitative data on the plant canopy coverage by species is much more useful in research than the mere listing of plant species and their respective basal areas. Canopy coverage is described as the area of ground upon which a plant exerts its influence (Daubenmire 1959).

For the purpose of determining cover values for species in a plot, Daubenmire microplots of 20 by 50 cm were placed along two transects within the sample plot. The 50 microplots were placed perpendicular to the transect lines toward the midline of the plot and read at one meter intervals. This method was employed during the summer of 1986. During the summer of 1987, canopy coverage by species was estimated over the entire plot area as opposed to using combined results of Daubenmire microplots. Some accuracy in determining canopy coverage could be lost by this method but the number of sites surveyed was increased. Studies of previous research revealed that when canopy coverage is estimated for an entire plot, as opposed to reading and tallying results from microplots, the results are still

within 10 percent of the Daubenmire microplot method (Dryness 1974, Pfister and Arno 1980).

Cover classes were relatively large to aid the researcher in estimating canopy coverage accurately (Daubenmire 1959). Cover classes used are listed on Table 3. Accuracy standards for canopy estimation were  $\pm$  one cover class. The midpoint values of the cover classes were ultimately assigned to each species for the purpose of data analysis.

Table 3. Plant canopy coverage classes

Code	% Canopy Coverage	Midpoint
11	.1 < 1%	.5
12	1 < 5%	3%
1	5 < 15%	10%
2	15 < 25%	20%
3	25 < 35%	30%
4	35 < 45%	40%
5	45 < 55%	50%
6	55 < 65%	60%
7	65 < 75%	70%
8	75 < 85%	80%
9	85 < 95%	90%

Plants sampled in each plot were divided into four categories:

1) trees, 2) shrubs, subshrubs and wood vines 3) graminoids, and 4) forbs. Reasonable attempts were made to identify all plant species in a plot. Those species not identifiable by the researcher were still recorded,

collected, tagged, and numbered and later referred to plant taxonomists for identification. Plant species were recorded on the data sheet using the first three letters of the genus name and specific epithet.

Additional data collected at each site included classification of the plant community, soil series, elevation, the slope aspect of each plot recorded in degrees, and the drainage area each site was located in. These variables were recorded for the purpose of determining their effects on plant species and communities distribution within the drainages.

### Data Analysis

Initially, the average percent cover of each species was determined overall sample sites in each drainage. In addition, the frequency of each species was calculated for each drainage. This information was used to determine which plant species were frequent enough among plots to be subjected to statistical analysis. To determine the differences in canopy coverage by species that occurred between the Rapid Creek and Battle Creek drainages, an analysis of covariance test was conducted separately for each species that occurred on 9 or more sites except for Pteridium aquilinum which occurred in only 6 sites but had high canopy coverage values. The analysis of covariance



test was organized so that the drainage (Rapid Creek vs Battle Creek) represented the independent variable. The dependent variable was canopy cover and elevation was the covariant.

By using analysis of covariance and assigning elevation as the covariant, one may detect differences in species canopy cover due to drainage while adjusting for elevational differences. In this test the effect of elevation on the plant canopy coverage is adjusted to a common elevation. The analysis of covariance test could also show which species have canopy coverage that is influenced by elevation. In determining which values (adjusted or unadjusted) were used for drainage from the analysis of covariance test the following if/then statements were applied: if the elevation value for species was not significant then the unadjusted value was used; if the elevation was significant the adjusted value was used.

For the purpose of determining patterns that may exist in the plant and site data a detrended correspondence analysis using Cornell University's DECORANA program was employed (Hill 1979). The detrended correspondence analysis program is a variation of reciprocal averaging that is useful for clarifying patterns that may exist in community data but are not readily apparent (Gauch 1982). Scores are

generated by inputting canopy coverage values by site for all species. The four axes that result from the DECORANA program represent standard deviations in weighted plant canopy coverage value for the species data averaged across sites, and standard deviations of weighted plant coverage for the site data averaged across species. With this method of ordination, axis 1 is truly independent of axes 2, 3, and 4. Axes 2, 3, and 4 may or may not be related to one another (Hill & Gauch). According to Gauch (1982), the variables that the axes represent are open to interpretation based on the patterns that result once the ordination has been completed. Thus, the interpretation of the resulting graphs is subjective and may be open to various conclusions.

Species	Species ID	Mean	Standard Deviation	Minimum	Maximum
<u>Betula</u>	Treatment				
<u>occidentalis</u>	Drainage	1	0.5	0	2
	Elevation	1	0.5	0	2
	Error	1	0.5	0	2
<u>Cornus</u>	Treatment				
<u>stolonifera</u>	Drainage	1	0.5	0	2
	Elevation	1	0.5	0	2
	Error	1	0.5	0	2

## RESULTS

Canopy Coverage of Major Species with Respect to Drainage System and Elevation

A total of 231 plant species <sup>was</sup> were observed within the 44 selected sites (Appendix 3). Of the 231 plants observed, 59 species were subjected to the analysis of covariance test. The test was applied to the cover values of all 59 species (Appendix 3). Of the 59 species tested, 12 species showed a significant difference in canopy coverage between the Rapid Creek and Battle Creek drainage (Table 4). Nomenclature of plants in this study follows the Great Plains Flora Association (1986).

**Table 4.** Analysis of covariance test for 15 plant species with a significant difference in canopy coverage between Rapid Creek and Battle Creek and/or with changes in elevation. (Nomenclature of plants follows the Great Plains Flora Association 1986)

Species	Sources of Variation	d.f.	F	d.f. Adjusted	F Adjusted	Slope
<u>Betula occidentalis</u>	Treatment:					
	Drainage	1	4.85**	1	7.86**	
	Elevation	1	10.40***			-.02
	Error	15		15		
<u>Cornus stolonifera</u>	Treatment:					
	Drainage	1	3.18**	1	2.69	
	Elevation	1	.02			
	Error	23		2		

Table 4. continued

Species	Sources of Variation	d.f.	F	d.f. Adjusted	F Adjusted	Slope
<u>Corylus cornuta</u>	Treatment:					
	Drainage	1	5.59**	1	9.45**	
	Elevation	1	3.86*			-.04
	Error	10		10		
<u>Galium triflorum</u>	Treatment:					
	Drainage	1	2.26	1	1.45	
	Elevation	1	3.28*			-.001
	Error	26		26		
<u>Monarda fistulosa</u>	Treatment:					
	Drainage	1	8.10**	1	6.22**	+.004
	Elevation	1	4.41			
	Error	6		6		
<u>Lathyrus ochroleucus</u>	Treatment:					
	Drainage	1				
	Elevation	1	4.11		4.11*	-.0004
	Error	9		9		
<u>Oryzopsis asperifolia</u>	Treatment:					
	Drainage	1	4.29*	1	3.79*	
	Elevation	1	.20			
	Error	9		9		
<u>Phleum pratense</u>	Treatment:					
	Drainage	1	1.41	1	5.84**	
	Elevation	1	4.48*	1	4.48*	-.01
	Error	9		9		
<u>Poa pratensis</u>	Treatment:					
	Drainage	1	5.57**	1	4.01*	
	Elevation	1	1.16			
	Error	34		34		
<u>Populus tremuloides</u>	Treatment:					
	Drainage	1	4.48*	1	5.71**	
	Elevation	1	1.75			
	Error	11		11		

Table 4. continued

Species	Sources of Variation	d.f.	F	d.f. Adjusted	F Adjusted	Slope
<u>Prunus virginiana</u>	Treatment:					
	Drainage	1	3.85*	1	3.37*	
	Elevation	1	1.99			
	Error	15		15		
<u>Pteridium aquilinum</u>	Treatment:					
	Drainage	1	3195.07**	1	1521.66**	
	Elevation	1	.04			
	Error	1		1		
<u>Smilacina stellata</u>	Treatment:					
	Drainage	1	.18		.31	
	Elevation	1	7.22**		7.22**	-.001
	Error	27		27		
<u>Symphoricarpos occidentalis</u>	Treatment:					
	Drainage	1	3.78*	1	2.94*	
	Elevation	1	.14			
	Error	24		24		
<u>Vicia americana</u>	Treatment:					
	Drainage	1	1.79	1	3.15*	
	Elevation	1	1.39			
	Error	24		24		

\* = p < .10      \*\* = p < .05      \*\*\* = p < .01

Seven species show a significant ( $p=.05$ ) difference in canopy coverage between the Rapid creek and Battle Creek drainages (Table 4). Five other species showed a significant ( $p=.10$ ) difference in plant canopy coverage between the two drainages.

Canopy coverages of the 12 species showing significant differences between the two drainage areas are compared in

Table 5. Those species exhibiting significantly ( $p < .05$ ) greater canopy coverage in Rapid Creek versus Battle Creek included Betula occidentalis, Monarda fistulosa, Phleum pratense, Poa pratensis, Populus tremuloides, and Pteridium aquilinum. Species more common ( $p < .10$ ) in Rapid Creek are Cornus stolonifera, Oryzopsis asperifolia, Prunus virginiana, Symphoricarpos occidentalis and Vicia americana. Only one species had a significantly ( $p < .05$ ) greater canopy coverage in Battle Creek than in Rapid Creek; it is Corylus cornuta. Acer negundo occurred only in the Rapid Creek drainage 6 times with a mean canopy coverage of 11%.

**Table 5.** Observed and least square means (adjusted) of plant canopy coverage for 12 species showing significant differences in canopy coverage between Rapid Creek and Battle Creek

Species	Means			
	Rapid Creek		Battle Creek	
	Actual	Adjusted	Actual	Adjusted
<u>Betula occidentalis</u>	25.4	27.8	1.8	- 2.9
<u>Corylus cornuta</u>	1.8	-17.1	37.3	43.0
<u>Cornus stolonifera</u>	7.0	7.0	2.9	3.0
<u>Monarda fistulosa</u>	5.3	4.8	.50	0.62
<u>Oryzopsis asperifolia</u>	6.2	6.1	1.9	2.0
<u>Phleum pratense</u>	4.4	12.2	1.1	- 4.5
<u>Poa pratensis</u>	18.7	18.0	5.7	6.6
<u>Populus tremuloides</u>	8.3	11.4	2.1	0.78
<u>Prunus virginiana</u>	7.9	7.7	2.4	2.6
<u>Pteridium aquilinum</u>	80.0	79.9	1.5	1.6
<u>Symphoricarpos occidentalis</u>	12.1	11.8	2.5	2.8
<u>Vicia americana</u>	1.0	1.1	.63	0.53

Of 59 plant species subjected to the analysis of covariance test, seven species displayed significant changes in canopy coverage due to elevation. Two species, (Table 4), Betula occidentalis and Smilacina stellata, in have significant ( $p < .05$ ) differences in canopy coverage with changes in elevation. Species showing significant ( $p < .10$ ) differences in canopy coverage in relation to elevation include Corylus cornuta, Galium triflorum, Lathyrus ochroleucus, Monarda fistulosa, and Phleum pratense.

The elevational ranges of each species as they occurred in the Rapid Creek and Battle Creek drainages are shown in Appendix 1. Reference to the slope value in the elevation column in Table 4 indicates the change in slope per unit change in elevation. Negative slopes indicate that canopy cover decreases as elevation increases while positive slopes indicate that canopy cover increases with increasing elevation. Betula occidentalis and Smilacina stellata both had slopes below 0. Among the other species showing a significant ( $p < .10$ ) difference in canopy coverage with changes in elevation, two have slope values above 0. They include Lathyrus ochroleucus and Monarda fistulosa. Three species with a significant ( $p < .10$ ) change in canopy

coverage having slope values below 0 include Corylus cornuta, Galium triflorum, and Phleum pratense.

#### Detrended Correspondence Analysis Of Vegetation Data

Detrended correspondence analysis is a form of ordination that reveals subtle patterns that may occur in ecological data (Gauch 1980). The output of detrended correspondence analysis is plotted on four axes, each representing standard deviations of, in this case, plant canopy coverage means. Two applications of detrended correspondence analysis are possible. One allows the researcher to analyze the plant canopy coverage of all species averaged across sites; the other analyzes the site averaged across species. According to Hill and Gauch (1982) the variable assigned to each axis is subjective and based on the researcher's knowledge of the data. By plotting values along axis 1 against the other axes sequentially one can hope to see a meaningful pattern develop. Figure 4 represents axis 1 of sample scores (by site) plotted against axis 2. Asterisks represent Rapid Creek sites while diamonds represent Battle Creek sites.

The values for sites located in the Battle Creek drainage tend to cluster to the left of the graph while the sites located in the Rapid Creek drainage are widely dispersed generally to the right of the graph.



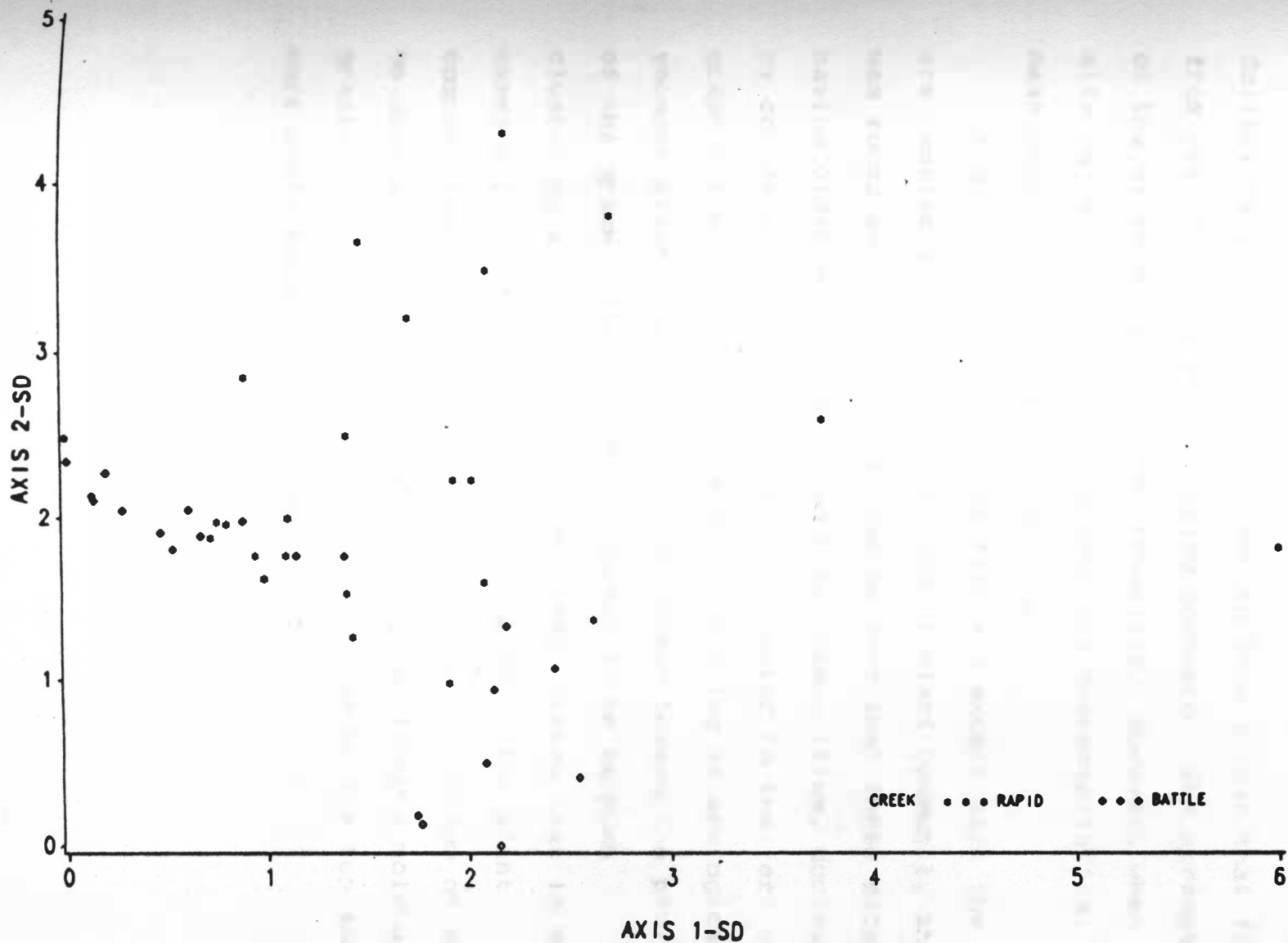


Figure 4. Graph of study sites from detrended correspondence analysis. Values represent site canopy coverage averaged across all species.

Collectively, all the sites tend to form a band that flows from left to right while turning downward. The arrangement of the sites may not be very revealing. However, when each site is labeled according to specific characteristics, more meaningful patterns tend to develop.

Figure 5 is identical to Figure 4 except that the sites are labeled according to the type of plant community that was found on each site. It can be seen that those sites having older more established plant communities, dominated by coniferous or deciduous trees, cluster to the left of the graph while the more open sites consisting of ecologically younger plant communities are dispersed toward the periphery of the graph. There does not appear to be as much clustering along axis 2. Gauch (1982) stated that in some cases axis 2 may be a product of "noise." The plant communities when viewed from the top to the bottom of axis 2 do show a tendency to arrange themselves along a moisture gradient, with more xeric community types at the top and more mesic types at the bottom.

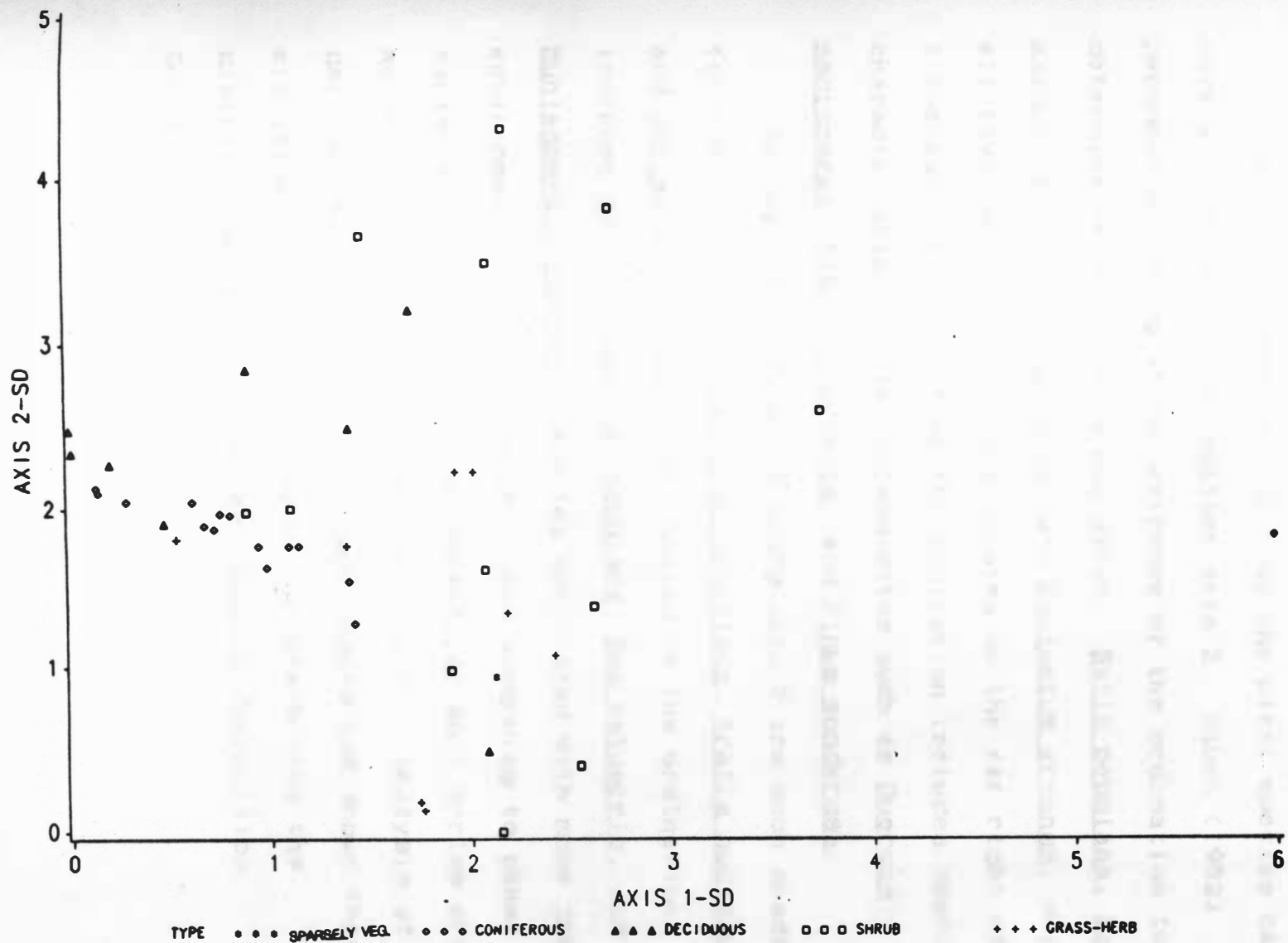


Figure 5. Graph of study sites labeled according to plant community type from detrended correspondence analysis.

Figure 6 represents axis 1 of the plant species canopy coverage scores plotted against axis 2. Gauch (1982) recommends looking at the extremes of the ordination to determine which patterns may exist. Salix bebbiana, Salix exigua, Betula occidentalis, and Equisetum arvense, which all favor wet habitats, are located on the far right of axis 1 whereas the far left of the ordination includes species characteristic of drier upland sites such as Quercus macrocarpa, Linnaea borealis, and Pinus ponderosa.

At the top of Figure 6 along axis 2 are such shade tolerant species as Pteridium aquilinum, Aralia nudicaulis, and Smilacina stellata. The bottom of the ordination includes Salix exigua, S. bebbiana, Poa palustris, and Muhlenbergia racemosa, species associated with more open environments. Labeling study sites according to other variables such as elevation, aspect, or soil series produced no detectable patterns in the ordination. Analysis of the data by Pearson Correlation Coefficients has shown that elevation is a very weak factor in determining the distribution of plant species (Pearson Correlation Coefficient = .22 N = 44).

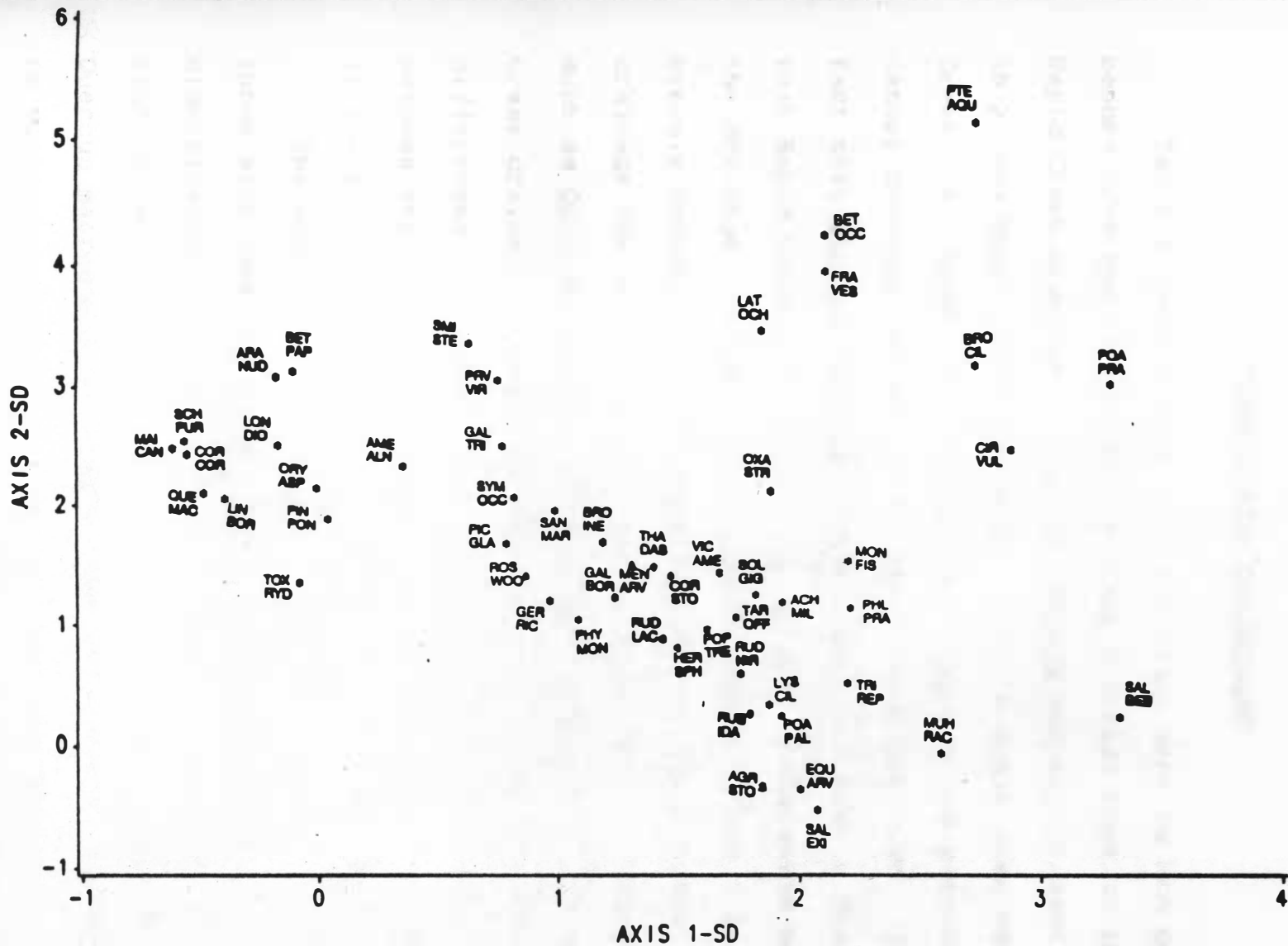


Figure 6. Graph of plant species canopy coverage scores by detrended correspondence analysis. (See Appendix III for key to species abbreviations).

### SUMMARY AND CONCLUSIONS

Table 4 reveals that only one plant species had greater canopy coverage in the Battle Creek drainage than in the Rapid Creek drainage. Corylus cornuta had significantly ( $p \geq .05$ ) more canopy coverage in Battle Creek than Rapid Creek. All other species listed in Table 4 had greater canopy coverage values in the Rapid Creek drainage. The fact that Corylus cornuta is more common in Battle Creek than Rapid Creek may reflect topographic differences between the drainage systems. Battle Creek generally has a narrow, steeply bounded riparian zone whereas the Rapid Creek drainage was more wide and open. A shade tolerant species such as Corylus cornuta may have been favored in the Battle Creek drainage. Based on these results it appears that the differences that occur in plant canopy coverage values between the two drainage areas may be primarily the result of the physical differences between the two drainages.

The analysis of covariance test for elevation indicated those plant species whose canopy coverage changed significantly ( $p < .10$ ) along the elevation gradient. One might expect that elevation-dependent species such as Quercus macrocarpa or Picea glauca would show a significant ( $p < .10$ ) change in canopy coverage with changes in elevation. While it is well known that Quercus macrocarpa

occupies low elevations and Picea glauca resides at high elevations, the canopy coverage of these species apparently exhibits little variation within the relatively narrow ranges of elevation in which they occur.

The seven plant species that show significant changes in canopy cover with changes in elevation occurred in fairly broad elevational ranges from 1212-1818 meters. Hayward (1928) describes Betula occidentalis and Corylus cornuta as high elevation species. Galium triflorum, Lathyrus ochroleucus, Monarda fistulosa, Phleum pratense and Smilacina stellata are described by Van Bruggen (1976) as species that occur throughout many areas of western South Dakota. The data may suggest that these seven species are highly adaptable plants that can survive in a variety of elevations but attain greatest development only within a particular range of elevation. All plant species occurred in much broader elevational ranges in Rapid Creek than in Battle Creek (Appendix II) and this probably reflects the broader elevational range of sites sampled along Rapid Creek.

#### Detrended Correspondence Analysis Of Vegetation Data

It was hoped that by submitting the canopy coverage data to detrended correspondence analysis, sample sites and plant species would show distribution in accordance with some

obvious variable such as elevation. It is clear that in the Black Hills there are many ecological factors other than elevation that affect plant growth and canopy coverage. Figure 5 shows that the study sites tended to cluster based on the type of plant community found within each study site. It appears that those sites having a more closed canopy and wetter conditions existed more frequently in Battle Creek than in Rapid Creek. The fact that the sites arrange themselves in this manner was likely a reflection of topographic differences between the two drainages. Since the variables represented by the axes are open to interpretation, it is reasonable to assign a relative measure of overstory canopy (light availability) to axis 1 while axis 2 may represent a moisture gradient.

Figure 6, in which ordination is done by species, reveals that there are other environmental factors more important than elevation influencing plant growth and distribution. Instead the species appear to be arranged according to light and water availability. Axis 1 of Figure 4 could represent a moisture gradient while axis 2 could represent light availability as determined by overstory canopy coverage.



## RECOMMENDATIONS FOR FURTHER STUDY

As in many scientific endeavors, the results of this study have raised more questions than answers. Although these recommendations do not necessarily reflect the objectives of this study, there are many applications of this project that could be of value to future research. Any future study to determine canopy coverage differences could have sites that occur at the same elevation, represent the same plant community type, and have the same history of disturbance. The amount of variability that may occur between the sites in each drainage would then be limited allowing the researcher to test various factors such as grazing pressure, to determine the effect on vegetation.

One could also sample the variety and amount of animal life present in each of the 44 sites to determine if there is a correlation between canopy cover and the abundance of certain animal species. Further research of plant communities needs to be conducted to determine what constitutes safe levels of use by man and livestock in the Black Hills riparian areas. Finally, and maybe most important, a classification and inventory of critical riparian habitat needs to be completed to protect remaining riparian areas.

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## Site Locations

Study sites were marked with either red or orange flagging tape on trees or branches at the boundary of each study plot. The north or east corner (whichever was closest to the creek) of each site is marked with an orange wooden stake or orange and white steel rebar. The locations of each of the 44 sites are described as follows.

Site 1 is 5 miles east of Rochford on Forest Route 231.

Where Gimlet Creek meets Forest Route 231 is a group of trailer homes. Continue east on the old railroad bed to the first bridge. The site is located south of this point about 250 yards along the inside bend of Rapid Creek.

Site 2 is 3 miles east of Rochford on Forest Route 231.

This site is located in a spruce stand situated between the road and Rapid Creek on the south side of the road.

Adjacent to the site to the east is private property. The site is located in Bearcat Gulch.

Site 3 is due west of Site 2 across the creek in a dense willow stand.

Site 4 is 3 miles east of Rochford on Forest Route 231 where Gimlet Creek meets 231. Follow the railroad grade east past the small cluster of homes to the first bridge. The site is

located 300 yards to the south and is across the creek from Site 1.

Site 5 is located where Forest Route 231 meets Forest Route 237, about 5 miles east of Rochford. Proceed 1/4 mile north from the intersection on road 237. The site is on the east side of the road in a stand of chokecherries by Gimlet Creek.

Site 6 is located off State Highway 44 near Rapid City at a point .75 miles above Canyon Lake. The site is located on the south side of Rapid Creek directly south of Cleghorn School Springs.

Site 7 is found west of Hisega. Hisega is located just off State Highway 44. At the town of Hisega turn right and go west along the road that is on the south side of Rapid Creek until a gate and private property are encountered. The site is located on the north side of Rapid Creek directly south of the first house.

Site 8 is 1.9 miles on Forest Route 181 west of Forest Route 231. The site is on the south side of the road and south of Castle Creek in a spruce stand.

Site 9 is 25 miles below Castle Peak Campground on Forest Route 181 just as it crosses Castle Creek. The site is on the north side of the creek and the south side of the road about 200 yards downstream from the bridge.



Site 10 is one mile downstream from Castle Peak campground on Forest Route 181. The site is south of the creek and the road in a dense spruce stand.

Site 11 is found after crossing the 4th bridge from Castle Peak Campground on Forest Route 181. The site is to the northeast of the road in an open meadow. Rapid Creek runs due south at this point.

Site 12 is seventy-five miles from Remington Camp on Forest Route 345. The site is located on the northwest side of the road and on the south edge of Iron Creek in a native oak stand.

Site 13 is at the end of Forest Route 345 located about 100 yards to the northeast of this point on the north side of Iron Creek.

Site 14 is 0.3 miles southwest of the end of Iron Creek road, Forest Road 345. The site is found in a birch-aspen stand on the east side of the road and the west side of the river.

Site 15 is 0.5 miles southwest of the end of Forest Route 345. Located south of the road and north of the creek the site consists primarily of sand bar willow.

Site 16 is 1.2 miles southwest of the end of Forest Route 345. The site is located on the north side of the road and

north of the creek adjacent to a beaver dam in a ponderosa pine stand.

Site 17 is found along Pine Creek as it runs out of Horsethief Lake. Follow Pine Creek downstream from Horsethief Lake for 0.33 mile. The site is directly south of a large granite peak rising 45 meters above the valley floor on the east side of the creek.

Site 18 is adjacent to and downstream from Site 17 at a distance of about 25 yards.

Site 19 is on the east side of Pine Creek about 900 yards below Horsethief Lake on a gravel bar with many willow-birch shrubs present.

Site 20 is upstream along Grizzly Creek from Grizzly Picnic Area which is located south of Keystone off U.S. Highway 16A. Follow the trail southwest out of the picnic ground and cross the stream twice. The site is located to the west of the trail, east of the creek in an oak-birch stand.

Site 21 is 0.5 miles upstream from Grizzly Picnic Area. Follow the trail to the Mount Rushmore National Memorial boundary. One-half mile beyond the boundary is Grizzly Creek. The site is on the opposite side of the creek and has several rocks and boulders in it. Cross the creek by using an old broken bridge.

Site 22 is at the base of Grizzly Bear Falls which is most easily reached by hiking upstream from Grizzly Picnic Area.

Site 23 is adjacent to but slightly upstream from site 21 in an aspen stand.

Site 24 is 0.25 miles above Horsethief Lake on Pine Creek. The site is on the south side of the creek and the trail in a spruce stand.

Site 25 is about 1 mile above Horsethief Lake along the main channel of Pine Creek. The site consists of a gravel bar with willow.

Site 26 is 0.5 miles above Horsethief Lake on Pine Creek. The site is east of the creek in a willow-aspen stand.

Site 27 is off of U.S. Highway 16A at the Ironcreek turnout which is on the south side of the road. Travel upstream, crossing the creek twice for a distance of 0.75 mile. The site is on the north side of the trail, south of the creek and is distinguished by many cottonwood trees.

Site 28 is found by taking State Highway 87 west from Custer State Park. Drive north on a gravel road located 0.25 mile west of the park boundary until you reach the turnaround. The site is 75 meters to the west between Iron Creek and the road.

Site 29 is adjacent to Site 15 in an aspen stand with a dense hazelnut understory.

Site 30 is .75 miles downstream from the Childrens Home Society located on Forest Route 365. The site is on Tepee Creek and is just outside the fence on Forest service land approximately 200 yards downstream from the private land.

Site 31 is downstream from Placerville Camp off State Highway 44. Walk through Placerville Camp following Rapid Creek. Th creek will turn sharply to the south and the site is located just before the old railroad bridge that crosses Rapid Creek.

Site 32 is .8 miles from Forest Route 419 west of Decifield Lake. The site is west of the road and on the west side of the south fork of Castle Creek.

Site 33 is 1.2 miles south of Pine Meadows Store on Forest Route 297. The site is just south of private land adjacent to some very old beaver dams on the west side of the road and west of Gold Run Creek.

Site 34 is located adjacent to and just to the north of site 31.

Site 35 is east of Silver City and .33 miles downstream from the bridge that crosses Rapid Creek. The site is in a boxelder stand on the north side of the creek.

Site 36 is 0.75 mile below Pactola Dam. The site is north of the road and obscured from view by a steep embankment extending below the road.

Site 37 is 0.20 mile east of Remington Camp off of Forest Route 345. Turn left on Forest Route 348 and go to the top of the hill. To the left is Battle Creek and a series of beaver dams. The site is between the road and the creek.

Site 38 is adjacent to and slightly north of site 37.

Site 39 is 2.1 miles southeast of Black Fox Campground on Forest Route 233. The site is to the south, between the road and Rhoades Fork of Castle Creek.

Site 40 is adjacent to Black Fox Campground where Rhoades Fork and South Fork meet. The site is on the north end of the campground in a wet meadow.

Site 41 is just north of and adjacent to site 40.

Site 42 is 0.7 mile north of Rochford on the west side of the road. The site is 0.1 mile north of a small home located on the east side of the road.

Site 43 is in the McIntosh Fen on Forest Route 110 about 1.25 miles northeast of the Deerfield store. The site is in a sage willow area on the south end of the valley.

Site 44 is adjacent to and northwest of site 43.

APPENDIX II - Elevation History of the Project  
 Station - Station 10+00 to Station 10+50

Station	Elevation History	
	1972	1973
Station 10+00	1172	1184
Station 10+10	1204	1212
Station 10+20	1200	1200
Station 10+30	1210	1210
Station 10+40	1210	1210
Station 10+50	1210	1210

## Appendix II

**Elevational ranges within which 7 plant species  
showed significant changes in canopy coverage**

<b>Species</b>	<b>Range of Elevation (Meters)</b>	
	<b>Rapid Creek</b>	<b>Battle Creek</b>
<i>Betula occidentalis</i>	1224 - 1818	1370 - 1551
<i>Corylus cornuta</i>	1224 - 1697	1224 - 1333
<i>Galium triflorum</i>	1042 - 1860	1280 - 1723
<i>Lathyrus ochroleucus</i>	1315 - 1860	1370 - 1723
<i>Monarda fistulosa</i>	1315	1370 - 1575
<i>Phleum pratense</i>	1575 - 1860	1370 - 1575
<i>Smilacena stellata</i>	1042 - 1848	1370 - 1677

FIG. 1. Location of study sites in the Adirondack Park  
 State Forest and the Adirondack Park State Park.  
 (Map of Fig. 1.)  
 18 and 19 are stations belonging to the  
 Adirondack Park State Park, 1985.

Code	Scientific Name/Authority	Common Name
1001		
1002	<i>Asplenium platyneuron</i> L.	Rock-fern
1003	<i>Adiantum petiolatum</i> (L.) Beck.	White-fern
1004	<i>Adiantum species L.</i>	Rock-fern
1005	<i>Adiantum petiolatum</i> Beck.	Green-fern
1006	<i>Adiantum Virginiana</i> (L.) Kuhn	Mountain-fern
1007	<b>APPENDIX III</b>	White-fern
1008	<i>Adiantum petiolatum</i> Beck.	Mountain-fern
1009	<i>Adiantum petiolatum</i> Beck.	White-fern
1010	<i>Adiantum petiolatum</i> Beck.	Mountain-fern
1011	<i>Adiantum petiolatum</i> Beck.	White-fern
1012	<i>Adiantum petiolatum</i> Beck.	Mountain-fern
1013	<i>Adiantum petiolatum</i> Beck.	White-fern
1014	<i>Adiantum petiolatum</i> Beck.	Mountain-fern
1015	<i>Adiantum petiolatum</i> Beck.	White-fern
1016	<i>Adiantum petiolatum</i> Beck.	Mountain-fern
1017	<i>Adiantum petiolatum</i> Beck.	White-fern
1018	<i>Adiantum petiolatum</i> Beck.	Mountain-fern
1019	<i>Adiantum petiolatum</i> Beck.	White-fern
1020	<i>Adiantum petiolatum</i> Beck.	Mountain-fern
1021	<i>Adiantum petiolatum</i> Beck.	White-fern
1022	<i>Adiantum petiolatum</i> Beck.	Mountain-fern
1023	<i>Adiantum petiolatum</i> Beck.	White-fern
1024	<i>Adiantum petiolatum</i> Beck.	Mountain-fern
1025	<i>Adiantum petiolatum</i> Beck.	White-fern
1026	<i>Adiantum petiolatum</i> Beck.	Mountain-fern
1027	<i>Adiantum petiolatum</i> Beck.	White-fern
1028	<i>Adiantum petiolatum</i> Beck.	Mountain-fern
1029	<i>Adiantum petiolatum</i> Beck.	White-fern
1030	<i>Adiantum petiolatum</i> Beck.	Mountain-fern



Plant Species Occurring In The 44 Study  
Sites of the Rapid and Battle Creek Drainages,  
Black Hills, S.D.

(Plant nomenclature according to the  
Great Plains Flora Association, 1986.)

Code	Scientific Name/Authority	Common Name
<b>Trees</b>		
ACENEG	<i>Acer negundo</i> L.	Boxelder
BETOCC*	<i>Betula occidentalis</i> Hook.	River birch
BETPAP*	<i>Betula papyrifera</i> L.	Paper birch
FRAPEN	<i>Fraxinus pennsylvanica</i> Marsh.	Green ash
OSTVIR	<i>Ostrya virginiana</i> (Mill.)K.Koch	Ironwood
PICGLA*	<i>Picea glauca</i> (Moench) Voss.	White spruce
PINPON*	<i>Pinus ponderosa</i> Lawson	Ponderosa pine
POPDEL	<i>Populus deltoides</i> Marsh. subspecies <i>monolifera</i> (Ait.) Eckenw.	Plains cottonwood
POPTRE*	<i>Populus tremuloides</i> Michx.	Quaking aspen
QUEMAC*	<i>Quercus macrocarpa</i> Michx.	Bur oak
SALALB	<i>Salix alba</i> L.	Yellowstem white Willow
SALAMY	<i>Salix amygdaloides</i> Anderss.	Peachleaf willow
ULMAME	<i>Ulmus americana</i> L.	American elm
<b><u>Shrubs, Subshrubs and woody vines</u></b>		
AMEALN*	<i>Amelanchier alnifolia</i> Nutt.	Serviceberry

Code	Scientific Name/Authority	Common Name
ARCUVA	Arctostaphylos uva-ursi (L.) Spreng.	Bearberry
CORSTO*	Cornus stolonifera Michx.	Red-osier dogwood
CORCOR*	Corylus cornuta Marsh	Beaked hazelnut
LONDIO	Lonicera dioica L.	Wild honeysuckle
PARVIT	Parthenocissus vitacea (Knerr) Hitch.	Virginia creeper
PHYMON*	Physocarpus monogynus (Torr.) Coul.	Ninebark
POTFRU	Potentilla fruticosa L.	Shrubby cinquefoil
PRUPEN	Prunus pennsylvanica L.f.	Pincherry
PRUVIR*	Prunus virginiana L.	Chokecherry
RHACAT	Rhamnus cathartica L.	Buckthorn
RIBAME	Ribes americanum Mill.	Currant
ROSWOO*	Rosa woodsii Lindl.	Wild rose
RUBIDA*	Rubus idaeus L.	Red raspberry
RUBPAR	Rubus parviflorus Nutt.	Thimbleberry
RUBPUB	Rubus pubescens Raf.	Blackberry
RUBSTR	Rubus strigosus Michx.	Raspberry

Code	Scientific Name/Authority	Common Name
SALBEB*	<i>Salix bebbiana</i> Sarg.	Bebb willow
SALCAN	<i>Salix candida</i> Fleugge	Sage willow
SALEXI	<i>Salix exigua</i> Nutt.	Coyote willow
SALLUT	<i>Salix lutea</i> Nutt.	Yellow willow
SALPLA	<i>Salix planifolia</i> Pursh	Planeleaf willow
SAMCAN	<i>Sambucus canadensis</i> L.	Elderberry
SAMRAC	<i>Sambucus racemosa</i> L.	Stinking elderberry
SHECAN	<i>Shepherdia canadensis</i> (L.) Nutt.	Buffaloberry
SPIBET	<i>Spiraea betulifolia</i> Pall.	Spiraea
SYMALB	<i>Symphoricarpos albus</i> (L.) Blake	Snowberry
SYMOCC*	<i>Symphoricarpos occidentalis</i> Hook	Snowberry
TOXRYD*	<i>Toxicodendron rydbergii</i> Greene	Poison ivy
VITRIP	<i>Vitis riparia</i> Michx.	Wild grape
<u>Graminoids</u>		
AGRCAN	<i>Agropyron caninum</i> (L.) Beauv.	Slender wheatgrass
AGRREP	<i>Agropyron repens</i> (L.) Beauv.	Quackgrass
AGRHYE	<i>Agrostis hyemalis</i> (Walt.) B.S.P.	Ticklegrass
AGRSCA	<i>Agrostis scabra</i> Willd.	Ticklegrass

Code	Scientific Name/Authority	Common Name
AGRSMI	<i>Agropyron smithii</i> Rydb.	Western wheatgrass
AGRSTO*	<i>Agrostis stolonifera</i> L.	Redtop
BROCIL*	<i>Bromus ciliatus</i> L.	Fringed brome
BROINE*	<i>Bromus inermis</i>	Smooth brome
BROMAR	<i>Bromus carinatus</i> H.A.	Mountain brome
CALCAN	<i>Calamagrostis canadensis</i> (Michx.) Beauv.	Bluejoint
CALINE	<i>Calamagrostis stricta</i> (Timm) Koel.	Reedgrass
CARATH	<i>Carex atherodes</i> Spreng.	Slough sedge
CARBEB	<i>Carex bebbii</i> Olney	Sedge
CARCON	<i>Carex concinna</i> R.Br.	Sedge
CARCAP	<i>Carex capillaris</i> L.	Sedge
CARDEW	<i>Carex deweyana</i> Schw.	Sedge
CARDIS	<i>Carex disperma</i> Dewey	Sedge
CAREMO	<i>Carex emoryii</i> Dewey	Sedge
CARFOE	<i>Carex foene</i> Willd	Sedge
CARHAY	<i>Carex haydenii</i> Dewey	Sedge
CARINT	<i>Carex interior</i> Bailey	Sedge
CARLAN	<i>Carex lanuginosa</i> Michx.	Wooly sedge

Code	Scientific Name/Authority	Common Name
CARMIC	<i>Carex microptera</i> Mack.	Sedge
CARNEB	<i>Carex nebraskensis</i> Dewey	Nebraska sedge
CARRET	<i>Carex retrorsa</i> Schw.	Sedge
CARROS	<i>Carex rosea</i> Schk.	Sedge
CARSCO	<i>Carex scoparia</i> Schk.	Sedge
CARSPR	<i>Carex sprengelii</i> Dewey	Sedge
CARSTI	<i>Carex stipata</i> Muhl.	Sedge
CARTEN	<i>Carex tenera</i> Dewey	Sedge
CATAQU	<i>Catabrosa aquatica</i> (L.) Beauv.	Brookgrass
DANSPI	<i>Danthonia spicata</i> (L.) Beauv.	Poverty oatgrass
DESCAE	<i>Deschampsia caespitosa</i> (L.) Beauv.	Hairgrass
DICACU	<i>Dicantheleum acuminatum</i> (SW.) Gould & Clark	Dicanthelium
DICLIN	<i>Dicantheleum linearifolium</i> (scribn.) Gould	Slime leaf dicanthelium
ELYCAN	<i>Elymus canadensis</i> L.	Canada wildrye
ELYVIR	<i>Elymus virginicus</i> L.	Virginia wildrye
FESGRA	<i>Festuca pratensis</i> Huds.	Meadow fescue
GLYGRA	<i>Glyceria grandis</i> S. Wats. ex A. Gray	American mannagrass
GLYSTRA	<i>Glyceria striata</i> (Lam.) Hitchc.	Fowl mannagrass

Code	Scientific Name/Authority	Common Name
JUNBAL	<i>Juncus balticus</i> Willd.	Baltic rush
JUNCON	<i>Juncus confusus</i> Cov.	Rush
LUZCAM	<i>Luzula campestris</i> (L.) DC.	Woodrush
MUHCUS	<i>Muhlenbergia cuspidata</i> (Torr.) Rydb.	Plains muhly grass
MUHMEX	<i>Muhlenbergia mexicana</i> (L.)Trin.	Mexican muhly
MUHRAC*	<i>Muhlenbergia racemosa</i> (Michx.) B.S.P.	Green muhly
ORYASP*	<i>Oryzopsis asperifolia</i> Michx.	Rough ricegrass
PANVIR	<i>Panicum virgatum</i> L.	Switchgrass
PHAARU	<i>Phalaris arundinacea</i> L.	Red canarygrass
PHLPRA*	<i>Phleum pratense</i> L.	Timothy
POACOM	<i>Poa compressa</i> L.	Canada bluegrass
POAPAL*	<i>Poa palustris</i> L.	Fowl bluegrass
POAPRA*	<i>Poa pratensis</i> L.	Kentucky Bluegrass
SCHPUR*	<i>Schizachne purpurascens</i> (Torr.) Swallen	False melic
SCIATR	<i>Scirpus atrocinctus</i> Fern.	Bulrush
SCIMIC	<i>Scirpus microcarpus</i> Presl	Bulrush
SPAMUL	<i>Sparganium multipedunculatum</i> (Morong) Rydb.	Burreed

Code	Scientific Name/Authority	Common Name
STIVIR	<i>Stipa viridula</i> Trin.	Green needlegrass
TYPLAT	<i>Typha latifolia</i> L.	Common cattail
<b><u>Forbs</u></b>		
ACHMIL*	<i>Achillea millefolium</i> L.	Yarrow
ACOCOL	<i>Aconitum columbianum</i> Nutt.	Monkshood
ACTRUB	<i>Actaea rubra</i> (Ait) Willd.	Baneberry
AGAFOE	<i>Agastache foeniculum</i> (Pursh) Kuntze	Giant hyssop
AGRSTR	<i>Agrimonia striata</i> Michx.	Agrimony
ALITRI	<i>Alisma triviale</i> Pursh	Water plantain
ALLCER	<i>Allium cernuum</i> Roth	Onion
AMPBRA	<i>Amphicarpaea bracteata</i> (L.) Fern	Hog peanut
ANAMAR	<i>Anaphallis margaritacea</i> (L.) Benth & Hook.	Pearly everlasting
ANEMUL	<i>Anemone multifida</i> Poir.	Wind flower
ANEVIR	<i>Anemone virginiana</i> L.	Wind flower
ANTMIC	<i>Antennaria microphylla</i> Rydb.	Pussy-toes
APOAND	<i>Apocynum androsaemifolium</i> L.	Spreading dogbane
APOCAN	<i>Apocynum cannabinum</i> L.	Dogbane
AQUBRE	<i>Aquilegia brevistyla</i> Hook.	Columbine

Code	Scientific Name/Authority	Common Name
ARANUD*	<i>Aralia nudicaulis</i> L.	Wild sarsaparilla
ARTDRA	<i>Artemisia dracunculus</i> L.	Greensage
ASTERI	<i>Aster ericoides</i> L.	Heath aster
ASTHES	<i>Aster hesperius</i> Gray	Marsh aster
ASTJUN	<i>Aster junciformis</i> Rydb.	Rush aster
ASTLAE	<i>Aster laevis</i> L.	Smooth blue aster
ASTMER	<i>Aster sibiricus</i> L.	Arctic aster
ATHFIL	<i>Athyrium felix-femina</i> L. Roth	Lady fern
BARVUL	<i>Barbarea vulgaris</i> R.Br.	Wintercress
BRASpp	<i>Brassica</i> species	Mustard
CAMRAP	<i>Campanula rapunculoides</i> L.	Bellflower
CAMROT	<i>Campanula rotundifolia</i> L.	Bluebell
CELSCA	<i>Celastrus scandens</i> L.	Bittersweet
CICMAC	<i>Cicuta maculata</i> L.	Water hemlock
CIRARV	<i>Cirsium arvense</i> (L.) Scop.	Canada thistle
CIRVUL*	<i>Cirsium vulgare</i> (Savi) Tenore	Bull thistle
CONARV	<i>Convolvulus arvensis</i> L.	Field bindweed
CONCAN	<i>Conyza canadensis</i> (L.) Cronq.	Horseweed
CORCAN	<i>Cornus canadensis</i> L.	Bunchberry
CORSpp	<i>Corallorhiza</i> species	Coralroot



Code	Scientific Name/Authority	Common Name
CYNOFF	<i>Cynoglossum officinale</i> L.	Hounds tongue
DISTRA	<i>Disporum trachycarpum</i> (Wats.) Benth & Hook.	Fairy bell
EPIANG	<i>Epilobium angustifolium</i> L.	Fireweed
EQUARV*	<i>Equisetum arvense</i> L.	Field horsetail
EQUHYE	<i>Equisetum hyemale</i> L.	Common scouring rush
EQLAE	<i>Equisetum laevigatum</i> A.Br.	Smooth scouring rush
EQU SYL	<i>Equisetum sylvaticum</i> L.	Wood horsetail
ERIGLA	<i>Erigeron glabellus</i> Nutt.	Fleabane
EUPMAC	<i>Eupatorium maculatum</i> L.	JoePye weed
ERIPHI	<i>Erigeron philadelphicus</i> L.	Daisy fleabane
EUTGRA	<i>Euthamia graminifolia</i> (L.) Nutt.	Euthamia
FRAVES*	<i>Fragaria vesca</i> L.	Strawberry
FRAVIR	<i>Fragaria virginiana</i> Duchne.	Strawberry
GALBOR*	<i>Galium boreale</i> L.	Northern bedstraw
GALTRI	<i>Galium triflorum</i> Michx.	Bedstraw
GENPUB	<i>Gentiana puberulenta</i> Pringle	Downy gentian

Code	Scientific Name/Authority	Common Name
GERRIC*	<i>Geranium richardsonii</i> <sup>Locke</sup> Fish & Trautv.	Wild geranium
GEUALE	<i>Geum aleppicum</i> Jacq.	Yellow avens
GEUMAC	<i>Geum macrophyllum</i> Willd.	Large leaved avens
GLEHEH	<i>Glechoma hederacea</i> L.	Ground Ivy
GLYLEP	<i>Glycyrrhiza lepidota</i> Pursh	American licorice
GOOREP	<i>Goodyera repens</i> (L.) R. Br. ex Ait.	Rattlesnake plaintain
HACDEF	<i>Hackelia deflexa</i> (Wahl.) Opiz	Stickseed
HACFLO	<i>Hackelia floribunda</i> (Lehm) Johnston	Stickseed
HALDEF	<i>Halenia deflexa</i> (Smith) Griseb.	Spurred gentian
HELRYD	<i>Helianthus rydbergii</i> (Cass.)	Nuttall's sunflower
HERSPH*	<i>Heracleum sphondylium</i> L.	Cow parsnip
PEURIC	<i>Heuchera richardsonii</i> R.Br.	Alum root
HUMLUP	<i>Humulus lupulus</i> L.	Hops
IRIMIS	<i>Iris missouriensis</i> Nutt.	Wild iris
LACBIE	<i>Lactuca biennis</i> (Moench) Fern.	Bluewood lettuce

Code	Scientific Name/Authority	Common Name
LATOCH*	<i>Lathyrus ochroleucus</i> Hook	Sweet pea
LEMMIN	<i>Lemna minor</i> L.	Duckweed
LEOCAR	<i>Leonurus cardiaca</i> L.	Motherwort
LINVUL	<i>Linaria vulgaris</i> Hill	Toadflax
LINBOR*	<i>Linnaea borealis</i> L.	Twinflower
LYCAME	<i>Lycopus americanus</i> Muhl. ex. Barton	Bugleweed
LYSCIL*	<i>Lysimachia ciliata</i> L.	Fringed loosestrife
MAICAN*	<i>Maianthemum canadensis</i> Desf.	Wild lily-of-the valley
MELALB	<i>Melilotus alba</i> Desr.	Sweet clover
MELOFF	<i>Melilotus officinalis</i> (L.) Pall.	Sweet clover
MENARV*	<i>Mentha arvensis</i> L.	Mint
MONFIS*	<i>Monarda fistulosa</i> L.	Horsemint
NEPCAT	<i>Nepeta cataria</i> L.	Catnip
ONOSEN	<i>Onoclea sensibilis</i>	Sensitive fern
OSMLON	<i>Osmorhiza longistylis</i> (Torrey) DC.	Sweet cicely
OXASTR*	<i>Oxalis stricta</i> L.	Wood sorrel

Code	Scientific Name/Authority	Common Name
PLAMAJ	<i>Plantago major</i> L.	Common plantain
POLCON	<i>Polygonum convolvulus</i> L.	Wild buckwheat
POTARG	<i>Potentilla arguta</i> Pursh.	Silvery cinquefoil
POTGRA	<i>Potentilla gracilis</i> Dougl. ex Hook.	Cinquefoil
POTNOR	<i>Potentilla norvegica</i> L.	Norwegian cinquefoil
POTQUI	<i>Potentilla quinquefolia</i> Rydb.	Cinquefoil
PRUVUL	<i>Prunella vulgaris</i> L.	Selfheal
PTEAND	<i>Pterospora andromedea</i> Nutt.	Pine drops
PTEAGU	<i>Pteridium aquilinum</i> (L.) Kuhn	Bracken fern
RANPEN	<i>Ranunculus pensylvanicus</i> L.f.	Bristly crowfoot
RANSCE	<i>Ranunculus sceleratus</i> L.	Cursed crowfoot
RATCOL	<i>Ratibida columnifera</i> (Nutt.) Wooton & Standley	Prairie coneflower
RUDHIR*	<i>Rudbeckia hirta</i> L.	Blackeyed Susan
RUDLAC*	<i>Rudbeckia laciniata</i> L.	Goldenglow
RUMCRI	<i>Rumex crispus</i> L.	Curled dock
RUMMEX	<i>Rumex mexicanus</i> Meissn.	Willow-leaved dock
SANMAR*	<i>Sanicula marilandica</i> L.	Black snakeroot

Code	Scientific Name/Authority	Common Name
SCUGAL	<i>Scutellaria galericulata</i> L.	Marsh skullcap
SENPSE	<i>Senecio pseud aureus</i> Rydb.	Groundsel
SMIRAC	<i>Smilacina racemosa</i> (L.) Desf.	False spikenard
SMISTE*	<i>Smilacina stellata</i> (L.) Desf.	Spikenard
SMIHER	<i>Smilax herbacea</i> L.	Carrion-flower
SOLCAN	<i>Solidago canadensis</i> L.	Canada goldenrod
SOLGIG*	<i>Solidago gigantea</i> Ait.	Late goldenrod
SOLMIS	<i>Solidago missouriensis</i> Nutt.	Missouri goldenrod
SOLRIG	<i>Solidago rigida</i> L.	Stiff goldenrod
SONASP	<i>Sonchus arvensis</i> L.	Sow thistle
STAPAL	<i>Stachys palustris</i> L.	Hedge nettle
STELON	<i>Stellaria longifolia</i> Muhl. ex. Willd.	Long-leaved stitchwort
STRAMP	<i>Streptopus amplexifolius</i> (L.) DC.	Twisted stalk
SWERAD	<i>Swertia radiata</i> (Kell.) Kuntz	Green gentian
TARERI	<i>Taraxacum raevigatum</i> (Willd.) DC.	Red-seeded dandelion
TAROFF*	<i>Taraxacum officinale</i> Weber	Common dandelion
THADAS*	<i>Thalictrum dasycarpum</i> Fisch & Ave-Lall	Purple meadow rue

Code	Scientific Name/Authority	Common Name
THAVEN	<i>Thalictrum venulosum</i> Trel.	Early meadow rue
TRADUB	<i>Tragopogon dubius</i> Scop.	Goatsbeard
TRIHYP	<i>Trifolium hybridum</i> L.	Alsike clover
TRIPRA	<i>Trifolium pratense</i> L.	Red clover
TRIREP	<i>Trifolium repens</i> L.	White clover
URTDIO	<i>Urtica dioica</i> L.	Stinging nettle
VERTHA	<i>Verbascum thapsus</i> L.	Mullein
VICAME*	<i>Vicia americana</i> Muhl.	American vetch
VIOCAN	<i>Viola canadensis</i> L.	Tall white violet
VIONUT	<i>Viola nuttallii</i> Pursh	Nuttall's violet
ZIZAPT	<i>Zizia aptera</i> (Gray) Fern.	Golden alexanders

\* Indicates species that occurred in 9 or more sites

APPENDIX IV

DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER	DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER
RAPID CREEK	1	TREE	PICGLA	30	RAPID CREEK	2	GRAM.	CARSPP	0.5
RAPID CREEK	1	SHRUB	BETOCC	2.5	RAPID CREEK	2	GRAM.	CARSPP	10
RAPID CREEK	1	SHRUB	CORSTO	20	RAPID CREEK	2	GRAM.	CARSPP	0.5
RAPID CREEK	1	SHRUB	RIBSPP	0.5	RAPID CREEK	2	GRAM.	ELYSAN	2.5
RAPID CREEK	1	SHRUB	ROSWOO	10	RAPID CREEK	2	GRAM.	MUHSPP	0.5
RAPID CREEK	1	SHRUB	RUBIDA	0.5	RAPID CREEK	2	GRAM.	POAPRA	2.5
RAPID CREEK	1	SHRUB	SALAMY	0.5	RAPID CREEK	2	GRAM.	SWENOD	0.5
RAPID CREEK	1	SHRUB	SALBEB	2.5	RAPID CREEK	2	FORB	ACHMIL	0.5
RAPID CREEK	1	SHRUB	SALINT	2.5	RAPID CREEK	2	FORB	ARANUD	20
RAPID CREEK	1	SHRUB	SYMOCC	2.5	RAPID CREEK	2	FORB	ASTLAE	2.5
RAPID CREEK	1	GRAM.	AGRREP	10	RAPID CREEK	2	FORB	CAMROT	0.5
RAPID CREEK	1	GRAM.	AGRSCA	0.5	RAPID CREEK	2	FORB	DISTRA	0.5
RAPID CREEK	1	GRAM.	AGRTRA	0.5	RAPID CREEK	2	FORB	EQUARV	10
RAPID CREEK	1	GRAM.	BROINE	2.5	RAPID CREEK	2	FORB	EUPMAC	0.5
RAPID CREEK	1	GRAM.	CARSPP	0.5	RAPID CREEK	2	FORB	FRAVIR	0.5
RAPID CREEK	1	GRAM.	CARSPP	2.5	RAPID CREEK	2	FORB	GALBOR	2.5
RAPID CREEK	1	GRAM.	CARSPP	10	RAPID CREEK	2	FORB	GALTRI	2.5
RAPID CREEK	1	GRAM.	MELOFF	0.5	RAPID CREEK	2	FORB	HERSPH	2.5
RAPID CREEK	1	GRAM.	MUHSPP	0.5	RAPID CREEK	2	FORB	LYSCIL	0.5
RAPID CREEK	1	GRAM.	POACOM	2.5	RAPID CREEK	2	FORB	MENARV	0.5
RAPID CREEK	1	GRAM.	POAPRA	10	RAPID CREEK	2	FORB	RUDHIR	0.5
RAPID CREEK	1	GRAM.	POASPP	2.5	RAPID CREEK	2	FORB	RUDLAC	20
RAPID CREEK	1	FORB	ACHMIL	0.5	RAPID CREEK	2	FORB	SMISTE	0.5
RAPID CREEK	1	FORB	ASTHES	0.5	RAPID CREEK	2	FORB	SOLCAN	0.5
RAPID CREEK	1	FORB	ASTSPP	0.5	RAPID CREEK	2	FORB	SOLGIG	0.5
RAPID CREEK	1	FORB	CIRARV	2.5	RAPID CREEK	2	FORB	TARERI	0.5
RAPID CREEK	1	FORB	EQUARV	2.5	RAPID CREEK	2	FORB	THAVEN	10
RAPID CREEK	1	FORB	EUPMAC	0.5	RAPID CREEK	2	FORB	THAVEN	0.5
RAPID CREEK	1	FORB	FRAVIR	0.5	RAPID CREEK	2	FORB	TRIHYB	2.5
RAPID CREEK	1	FORB	GALBOR	10	RAPID CREEK	2	FORB	VIOSPP	2.5
RAPID CREEK	1	FORB	GALTRI	0.5	RAPID CREEK	2	FORB	VIOSPP	0.5
RAPID CREEK	1	FORB	GEUSPP	0.5	RAPID CREEK	3	TREE	PICGLA	0.5
RAPID CREEK	1	FORB	GLYLEP	20	RAPID CREEK	3	SHRUB	BETOCC	0.5
RAPID CREEK	1	FORB	HERSPH	2.5	RAPID CREEK	3	SHRUB	CORSTO	10
RAPID CREEK	1	FORB	LYSCIL	2.5	RAPID CREEK	3	SHRUB	RIBAME	0.5
RAPID CREEK	1	FORB	OXASTR	0.5	RAPID CREEK	3	SHRUB	RIBSPP	2.5
RAPID CREEK	1	FORB	RUDHIR	0.5	RAPID CREEK	3	SHRUB	ROSWOO	0.5
RAPID CREEK	1	FORB	RUDLAC	10	RAPID CREEK	3	SHRUB	RUBIDA	20
RAPID CREEK	1	FORB	SMISTE	0.5	RAPID CREEK	3	SHRUB	RUBIDA	2.5
RAPID CREEK	1	FORB	SOLGIG	10	RAPID CREEK	3	SHRUB	SALBEB	2.5
RAPID CREEK	1	FORB	STAPAL	0.5	RAPID CREEK	3	SHRUB	SALINT	30
RAPID CREEK	1	FORB	THAVEN	2.5	RAPID CREEK	3	SHRUB	SYMOCC	0.5
RAPID CREEK	1	FORB	TRIREP	0.5	RAPID CREEK	3	GRAM.	AGRSP	2.5
RAPID CREEK	1	FORB	VICAME	2.5	RAPID CREEK	3	GRAM.	BROINE	10
RAPID CREEK	1	FORB	VIOSPP	0.5	RAPID CREEK	3	GRAM.	CARSPP	2.5
RAPID CREEK	1	FORB	ZIZAPT	0.5	RAPID CREEK	3	GRAM.	CARSPP	2.5
RAPID CREEK	2	TREE	PICGLA	60	RAPID CREEK	3	GRAM.	ELYSPP	2.5
RAPID CREEK	2	SHRUB	AMEALN	0.5	RAPID CREEK	3	GRAM.	POAPRA	20
RAPID CREEK	2	SHRUB	BETOCC	0.5	RAPID CREEK	3	FORB	ACHMIL	0.5
RAPID CREEK	2	SHRUB	CORSTO	10	RAPID CREEK	3	FORB	CIRVUL	0.5
RAPID CREEK	2	SHRUB	PRUVIR	2.5	RAPID CREEK	3	FORB	EQUARV	2.5
RAPID CREEK	2	SHRUB	RIBSPP	2.5	RAPID CREEK	3	FORB	ERIPHI	0.5
RAPID CREEK	2	SHRUB	RIBSPP	10	RAPID CREEK	3	FORB	EUPMAC	2.5
RAPID CREEK	2	SHRUB	ROSWOO	2.5	RAPID CREEK	3	FORB	FRAVIR	0.5
RAPID CREEK	2	SHRUB	RUBGLA	0.5	RAPID CREEK	3	FORB	GALBOR	2.5
RAPID CREEK	2	SHRUB	RUBSTR	2.5	RAPID CREEK	3	FORB	GALTRI	2.5
RAPID CREEK	2	SHRUB	SYMOCC	10	RAPID CREEK	3	FORB	GEUMAC	2.5
RAPID CREEK	2	SHRUB	SYMOCC	10	RAPID CREEK	3	FORB	LEOCAR	0.5



DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER	DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER
RAPID CREEK	3	FORB	LINVUL	2.5	RAPID CREEK	5	SHRUB	SYMOC	10
RAPID CREEK	3	FORB	LYSCIL	20	RAPID CREEK	5	GRAM.	AGRSPP	0.5
RAPID CREEK	3	FORB	MELOFF	0.5	RAPID CREEK	5	GRAM.	BROINE	2.5
RAPID CREEK	3	FORB	MELOFF	0.5	RAPID CREEK	5	GRAM.	CARSPP	30
RAPID CREEK	3	FORB	OXASTR	0.5	RAPID CREEK	5	GRAM.	POAPRA	10
RAPID CREEK	3	FORB	RUDLAC	10	RAPID CREEK	5	FORB	ACHMIL	0.5
RAPID CREEK	3	FORB	RUDSER	0.5	RAPID CREEK	5	FORB	BARVUL	2.5
RAPID CREEK	3	FORB	SANMAR	0.5	RAPID CREEK	5	FORB	CIRSPP	0.5
RAPID CREEK	3	FORB	SMISTE	0.5	RAPID CREEK	5	FORB	GALBOR	2.5
RAPID CREEK	3	FORB	SOLMIS	10	RAPID CREEK	5	FORB	GALTRI	0.5
RAPID CREEK	3	FORB	STAPAL	0.5	RAPID CREEK	5	FORB	GEUMAC	2.5
RAPID CREEK	3	FORB	TAROFF	0.5	RAPID CREEK	5	FORB	HERSPH	10
RAPID CREEK	3	FORB	THADAS	2.5	RAPID CREEK	5	FORB	OXASTR	2.5
RAPID CREEK	3	FORB	TRIREP	2.5	RAPID CREEK	5	FORB	POLCON	0.5
RAPID CREEK	3	FORB	VICAME	2.5	RAPID CREEK	5	FORB	RUDSER	0.5
RAPID CREEK	3	FORB	VIOSPP	0.5	RAPID CREEK	5	FORB	SOLGIG	0.5
RAPID CREEK	4	TREE	PICGLA	2.5	RAPID CREEK	5	FORB	TAROFF	0.5
RAPID CREEK	4	SHRUB	BETOC	0.5	RAPID CREEK	5	FORB	THADAS	2.5
RAPID CREEK	4	SHRUB	CORSTO	20	RAPID CREEK	5	FORB	URTDIO	0.5
RAPID CREEK	4	SHRUB	HELRYD	2.5	RAPID CREEK	5	FORB	VICAME	0.5
RAPID CREEK	4	SHRUB	RIBAME	0.5	RAPID CREEK	6	TREE	ACENEG	10
RAPID CREEK	4	SHRUB	RIBSPP	2.5	RAPID CREEK	6	TREE	FRAPEN	20
RAPID CREEK	4	SHRUB	ROSWO	2.5	RAPID CREEK	6	TREE	OSTVIR	20
RAPID CREEK	4	SHRUB	RUBIDA	2.5	RAPID CREEK	6	TREE	POPDEL	10
RAPID CREEK	4	SHRUB	SALBEB	10	RAPID CREEK	6	TREE	QUEMAC	0.5
RAPID CREEK	4	SHRUB	SALINT	2.5	RAPID CREEK	6	SHRUB	ACENEG	2.5
RAPID CREEK	4	SHRUB	SYMOC	10	RAPID CREEK	6	SHRUB	CAMRAP	2.5
RAPID CREEK	4	GRAM.	AGRSMI	2.5	RAPID CREEK	6	SHRUB	PARINS	0.5
RAPID CREEK	4	GRAM.	BROINE	2.5	RAPID CREEK	6	SHRUB	PRUVIR	10
RAPID CREEK	4	GRAM.	CARSPP	2.5	RAPID CREEK	6	SHRUB	RHACAT	0.5
RAPID CREEK	4	GRAM.	CARSPP	2.5	RAPID CREEK	6	SHRUB	RIBSPP	0.5
RAPID CREEK	4	GRAM.	POAPRA	40	RAPID CREEK	6	SHRUB	SYMALB	2.5
RAPID CREEK	4	FORB	CIRSPP	2.5	RAPID CREEK	6	GRAM.	BROINE	2.5
RAPID CREEK	4	FORB	EQUARV	2.5	RAPID CREEK	6	GRAM.	BROINE	10
RAPID CREEK	4	FORB	EUPMAC	2.5	RAPID CREEK	6	GRAM.	CARSPP	10
RAPID CREEK	4	FORB	GALBOR	10	RAPID CREEK	6	GRAM.	CARSPP	0.5
RAPID CREEK	4	FORB	GALTRI	0.5	RAPID CREEK	6	GRAM.	ORYASP	0.5
RAPID CREEK	4	FORB	LINVUL	0.5	RAPID CREEK	6	GRAM.	POAPRA	2.5
RAPID CREEK	4	FORB	LYSCIL	2.5	RAPID CREEK	6	FORB	AMPBRA	0.5
RAPID CREEK	4	FORB	MELOFF	2.5	RAPID CREEK	6	FORB	ARANUD	20
RAPID CREEK	4	FORB	OXASTR	0.5	RAPID CREEK	6	FORB	ATHFIL	0.5
RAPID CREEK	4	FORB	RUDHIR	0.5	RAPID CREEK	6	FORB	FRAPEN	0.5
RAPID CREEK	4	FORB	RUDLAC	10	RAPID CREEK	6	FORB	GALBOR	0.5
RAPID CREEK	4	FORB	SOLMIS	10	RAPID CREEK	6	FORB	GALTRI	2.5
RAPID CREEK	4	FORB	STAPAL	0.5	RAPID CREEK	6	FORB	GLEHED	2.5
RAPID CREEK	4	FORB	TAROFF	0.5	RAPID CREEK	6	FORB	LYSCIL	0.5
RAPID CREEK	4	FORB	THADAS	2.5	RAPID CREEK	6	FORB	OSMSPP	0.5
RAPID CREEK	4	FORB	TRIREP	10	RAPID CREEK	6	FORB	OXASTR	0.5
RAPID CREEK	4	FORB	VICAME	2.5	RAPID CREEK	6	FORB	RANSCE	0.5
RAPID CREEK	4	FORB	VIONUT	0.5	RAPID CREEK	6	FORB	RHACAT	0.5
RAPID CREEK	4	FORB	VIOSPP	2.5	RAPID CREEK	6	FORB	SMISTE	10
RAPID CREEK	5	TREE	POPTRE	10	RAPID CREEK	6	FORB	SMISTE	0.5
RAPID CREEK	5	SHRUB	AMEALN	20	RAPID CREEK	6	FORB	STELON	0.5
RAPID CREEK	5	SHRUB	PRUVIR	10	RAPID CREEK	6	FORB	SYMALB	2.5
RAPID CREEK	5	SHRUB	RIBSPP	0.5	RAPID CREEK	6	FORB	TAROFF	0.5
RAPID CREEK	5	SHRUB	ROSWO	10	RAPID CREEK	6	FORB	VIOSPP	0.5
RAPID CREEK	5	SHRUB	RUBIDA	2.5	RAPID CREEK	7	TREE	ACENEG	20

DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER	DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER
RAPID CREEK	7	TREE	OSTVIR	20	RAPID CREEK	8	FORB	GALBOR	2.5
RAPID CREEK	7	TREE	ULMNE	20	RAPID CREEK	8	FORB	GALTRI	0.5
RAPID CREEK	7	SHRUB	BETOCC	30	RAPID CREEK	8	FORB	GEUALE	0.5
RAPID CREEK	7	SHRUB	CORCOR	2.5	RAPID CREEK	8	FORB	MENARV	0.5
RAPID CREEK	7	SHRUB	CORSTO	10	RAPID CREEK	8	FORB	RUDHIR	0.5
RAPID CREEK	7	SHRUB	LONDIO	0.5	RAPID CREEK	8	FORB	SMISTE	2.5
RAPID CREEK	7	SHRUB	PRUVIR	2.5	RAPID CREEK	8	FORB	SOLSPP	0.5
RAPID CREEK	7	SHRUB	ROSWOO	0.5	RAPID CREEK	8	FORB	STAPAL	0.5
RAPID CREEK	7	SHRUB	RUBIDA	0.5	RAPID CREEK	8	FORB	TAROFF	0.5
RAPID CREEK	7	SHRUB	RUBIDA	0.5	RAPID CREEK	8	FORB	THADAS	0.5
RAPID CREEK	7	SHRUB	SYMOCC	2.5	RAPID CREEK	8	FORB	VICAME	0.5
RAPID CREEK	7	SHRUB	TOXRYD	2.5	RAPID CREEK	8	FORB	VIOSPP	0.5
RAPID CREEK	7	GRAM.	APOCAN	0.5	RAPID CREEK	9	TREE	PICGLA	30
RAPID CREEK	7	GRAM.	CARSPP	2.5	RAPID CREEK	9	SHRUB	ROSWOO	20
RAPID CREEK	7	GRAM.	CARSPP	2.5	RAPID CREEK	9	SHRUB	RUBSPP	0.5
RAPID CREEK	7	GRAM.	MUHMEY	10	RAPID CREEK	9	SHRUB	SAMRAC	0.5
RAPID CREEK	7	GRAM.	POAPRA	10	RAPID CREEK	9	SHRUB	SYMOCC	30
RAPID CREEK	7	FORB	AMPBRA	2.5	RAPID CREEK	9	GRAM.	AGRSPP	10
RAPID CREEK	7	FORB	ASTSPP	0.5	RAPID CREEK	9	GRAM.	BROINE	10
RAPID CREEK	7	FORB	CELSCA	10	RAPID CREEK	9	GRAM.	CARSPP	2.5
RAPID CREEK	7	FORB	EQUARV	2.5	RAPID CREEK	9	GRAM.	ORYASP	10
RAPID CREEK	7	FORB	GALBOR	0.5	RAPID CREEK	9	GRAM.	POAPRA	10
RAPID CREEK	7	FORB	GALTRI	0.5	RAPID CREEK	9	FORB	ACHMIL	0.5
RAPID CREEK	7	FORB	MAICAN	0.5	RAPID CREEK	9	FORB	ARANUD	0.5
RAPID CREEK	7	FORB	OSMLON	0.5	RAPID CREEK	9	FORB	ASTSPP	2.5
RAPID CREEK	7	FORB	OXASTR	0.5	RAPID CREEK	9	FORB	GALBOR	2.5
RAPID CREEK	7	FORB	PARINS	2.5	RAPID CREEK	9	FORB	GALTRI	0.5
RAPID CREEK	7	FORB	RUDHIR	0.5	RAPID CREEK	9	FORB	MAICAN	0.5
RAPID CREEK	7	FORB	RUDHIR	0.5	RAPID CREEK	9	FORB	RUDLAC	2.5
RAPID CREEK	7	FORB	RUDLAC	0.5	RAPID CREEK	9	FORB	SMISTE	0.5
RAPID CREEK	7	FORB	SANMAR	0.5	RAPID CREEK	9	FORB	TAROFF	10
RAPID CREEK	7	FORB	SANMAR	0.5	RAPID CREEK	9	FORB	THADAS	2.5
RAPID CREEK	7	FORB	SEUGAL	0.5	RAPID CREEK	9	FORB	TRIREP	2.5
RAPID CREEK	7	FORB	SMISTE	2.5	RAPID CREEK	9	FORB	VICAME	0.5
RAPID CREEK	7	FORB	TAROFF	2.5	RAPID CREEK	9	FORB	VIOSPP	0.5
RAPID CREEK	7	FORB	THADAS	0.5	RAPID CREEK	10	TREE	PICGLA	90
RAPID CREEK	7	FORB	TRIREP	0.5	RAPID CREEK	10	SHRUB	AMEALN	0.5
RAPID CREEK	7	FORB	VIOSPP	0.5	RAPID CREEK	10	SHRUB	CORSPP	0.5
RAPID CREEK	7	FORB	VITRIP	2.5	RAPID CREEK	10	SHRUB	FRAVES	0.5
RAPID CREEK	8	TREE	PICGLA	50	RAPID CREEK	10	SHRUB	PRUVIR	20
RAPID CREEK	8	TREE	PINPON	30	RAPID CREEK	10	SHRUB	RIBSPP	0.5
RAPID CREEK	8	SHRUB	ACTALB	0.5	RAPID CREEK	10	SHRUB	ROSWOO	2.5
RAPID CREEK	8	SHRUB	AMEALN	2.5	RAPID CREEK	10	SHRUB	SYMOCC	20
RAPID CREEK	8	SHRUB	CORSTO	0.5	RAPID CREEK	10	GRAM.	AGRSPP	10
RAPID CREEK	8	SHRUB	PRUVIR	0.5	RAPID CREEK	10	GRAM.	ALLCER	0.5
RAPID CREEK	8	SHRUB	ROSWOO	2.5	RAPID CREEK	10	GRAM.	CARSPP	2.5
RAPID CREEK	8	SHRUB	RUBIDA	2.5	RAPID CREEK	10	GRAM.	ORYASP	10
RAPID CREEK	8	SHRUB	SALINT	2.5	RAPID CREEK	10	GRAM.	OSMSPP	0.5
RAPID CREEK	8	SHRUB	SYMOCC	60	RAPID CREEK	10	GRAM.	POAPRA	0.5
RAPID CREEK	8	GRAM.	BROINE	2.5	RAPID CREEK	10	GRAM.	STIVIR	0.5
RAPID CREEK	8	GRAM.	CARSPP	2.5	RAPID CREEK	10	FORB	ARANUD	2.5
RAPID CREEK	8	GRAM.	MUHSP	0.5	RAPID CREEK	10	FORB	GALBOR	0.5
RAPID CREEK	8	GRAM.	ORYASP	10	RAPID CREEK	10	FORB	GALTRI	0.5
RAPID CREEK	8	GRAM.	POAPRA	2.5	RAPID CREEK	10	FORB	LINBOR	2.5
RAPID CREEK	8	FORB	ACHMIL	0.5	RAPID CREEK	10	FORB	MAICAN	0.5
RAPID CREEK	8	FORB	ARANUD	2.5	RAPID CREEK	10	FORB	RUDHIR	0.5
RAPID CREEK	8	FORB	ASTSPP	0.5	RAPID CREEK	10	FORB	RUDLAC	0.5

DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER	DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER
RAPID CREEK	10	FORB	SMISTE	2.5	RAPID CREEK	32	SHRUB	RIBSPP	0.5
RAPID CREEK	10	FORB	SPIBET	2.5	RAPID CREEK	32	SHRUB	ROSWO	0.5
RAPID CREEK	10	FORB	TAROFF	0.5	RAPID CREEK	32	SHRUB	SALBEB	0.5
RAPID CREEK	10	FORB	TRIREP	0.5	RAPID CREEK	32	SHRUB	SHECAN	0.5
RAPID CREEK	10	FORB	VICAME	0.5	RAPID CREEK	32	SHRUB	SPIBET	0.5
RAPID CREEK	10	FORB	VIOSPP	2.5	RAPID CREEK	32	SHRUB	SYMOCC	0.5
RAPID CREEK	10	FORB	VIOSPP	2.5	RAPID CREEK	32	GRAM.	AGRSTO	0.5
RAPID CREEK	11	TREE	PICGLA	2.5	RAPID CREEK	32	GRAM.	AGRSTO	0.5
RAPID CREEK	11	SHRUB	ARTDRA	0.5	RAPID CREEK	32	GRAM.	CARCAP	10
RAPID CREEK	11	SHRUB	ROSWO	0.5	RAPID CREEK	32	GRAM.	CARMIC	0.5
RAPID CREEK	11	SHRUB	RUBIDE	0.5	RAPID CREEK	32	GRAM.	CARSPP	0.5
RAPID CREEK	11	SHRUB	SYMOCC	30	RAPID CREEK	32	GRAM.	CARSPP	0.5
RAPID CREEK	11	GRAM.	BROCIL	0.5	RAPID CREEK	32	GRAM.	EQUARV	2.5
RAPID CREEK	11	GRAM.	BROINE	20	RAPID CREEK	32	GRAM.	PHLPRA	0.5
RAPID CREEK	11	GRAM.	CARSPP	0.5	RAPID CREEK	32	GRAM.	SCHPUR	0.5
RAPID CREEK	11	GRAM.	POAPRA	40	RAPID CREEK	32	FORB	ACHMIL	0.5
RAPID CREEK	11	FORB	ACHLAN	2.5	RAPID CREEK	32	FORB	ACOCOL	0.5
RAPID CREEK	11	FORB	ASTERI	0.5	RAPID CREEK	32	FORB	ACTRUB	0.5
RAPID CREEK	11	FORB	CONCAN	0.5	RAPID CREEK	32	FORB	ANTMIC	0.5
RAPID CREEK	11	FORB	ERIGLA	2.5	RAPID CREEK	32	FORB	ASTSPP	0.5
RAPID CREEK	11	FORB	GALBOR	2.5	RAPID CREEK	32	FORB	CAMROT	0.5
RAPID CREEK	11	FORB	MONFIS	10	RAPID CREEK	32	FORB	GALTRI	0.5
RAPID CREEK	11	FORB	OXASTR	0.5	RAPID CREEK	32	FORB	GERRIC	0.5
RAPID CREEK	11	FORB	RATCOL	0.5	RAPID CREEK	32	FORB	HERSPH	0.5
RAPID CREEK	11	FORB	RUDHIR	0.5	RAPID CREEK	32	FORB	LYSCIL	0.5
RAPID CREEK	11	FORB	RUDLAC	0.5	RAPID CREEK	32	FORB	RUDHIR	0.5
RAPID CREEK	11	FORB	SMISTE	0.5	RAPID CREEK	32	FORB	SANMAR	0.5
RAPID CREEK	11	FORB	TAROFF	0.5	RAPID CREEK	32	FORB	SENPSE	0.5
RAPID CREEK	11	FORB	THADAS	2.5	RAPID CREEK	32	FORB	SMISTE	0.5
RAPID CREEK	11	FORB	TRIREP	0.5	RAPID CREEK	32	FORB	TAROFF	0.5
RAPID CREEK	11	FORB	VICAME	0.5	RAPID CREEK	32	FORB	THADAS	0.5
RAPID CREEK	11	FORB	VIOSPP	0.5	RAPID CREEK	32	FORB	THASPP	0.5
RAPID CREEK	11	FORB	VIOSPP	0.5	RAPID CREEK	32	FORB	TRIREP	2.5
RAPID CREEK	31	TREE	ACENEG	10	RAPID CREEK	32	FORB	VICAME	0.5
RAPID CREEK	31	TREE	ULMAME	2.5	RAPID CREEK	32	FORB	VIOSPP	2.5
RAPID CREEK	31	SHRUB	BETOCC	80	RAPID CREEK	32	FORB	ZIZAPT	0.5
RAPID CREEK	31	SHRUB	CORSTO	0.5	RAPID CREEK	33	TREE	PICGLA	30
RAPID CREEK	31	SHRUB	FRAVES	0.5	RAPID CREEK	33	TREE	POPTRE	0.5
RAPID CREEK	31	SHRUB	RIBSPP	0.5	RAPID CREEK	33	SHRUB	FRAVIR	0.5
RAPID CREEK	31	SHRUB	RUBIDA	0.5	RAPID CREEK	33	SHRUB	RIBSPP	0.5
RAPID CREEK	31	SHRUB	SALALB	0.5	RAPID CREEK	33	SHRUB	ROSWO	0.5
RAPID CREEK	31	GRAM.	AGRCAN	0.5	RAPID CREEK	33	SHRUB	RUBIDA	0.5
RAPID CREEK	31	GRAM.	CARDEW	50	RAPID CREEK	33	SHRUB	SALBEB	30
RAPID CREEK	31	GRAM.	CARDIS	2.5	RAPID CREEK	33	SHRUB	SYMOCC	0.5
RAPID CREEK	31	GRAM.	CARSPP	0.5	RAPID CREEK	33	GRAM.	BROCIL	2.5
RAPID CREEK	31	GRAM.	POAPRA	0.5	RAPID CREEK	33	GRAM.	BROINE	0.5
RAPID CREEK	31	FORB	GALTRI	0.5	RAPID CREEK	33	GRAM.	CALCAN	20
RAPID CREEK	31	FORB	POTSPP	0.5	RAPID CREEK	33	GRAM.	CARMIC	0.5
RAPID CREEK	31	FORB	PTEAQU	80	RAPID CREEK	33	GRAM.	CARROS	10
RAPID CREEK	31	FORB	RUDLAC	0.5	RAPID CREEK	33	GRAM.	GLYSTR	2.5
RAPID CREEK	31	FORB	SMISTE	0.5	RAPID CREEK	33	GRAM.	POAPRA	20
RAPID CREEK	31	FORB	SOLRID	0.5	RAPID CREEK	33	FORB	ACHMIL	0.5
RAPID CREEK	31	FORB	VIOSPP	0.5	RAPID CREEK	33	FORB	ACOCOL	2.5
RAPID CREEK	32	TREE	PICGLA	50	RAPID CREEK	33	FORB	ASTSPP	0.5
RAPID CREEK	32	SHRUB	CORSTO	0.5	RAPID CREEK	33	FORB	CICDIO	0.5
RAPID CREEK	32	SHRUB	FRAVES	2.5	RAPID CREEK	33	FORB	CIRVUL	0.5
RAPID CREEK	32	SHRUB	LINBOR	2.5	RAPID CREEK	33	FORB	CYAOFF	0.5

DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER	DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER
RAPID CREEK	33	FORB	EQUARV	0.5	RAPID CREEK	34	FORB	VIOSPP	0.5
RAPID CREEK	33	FORB	GALBOR	0.5	RAPID CREEK	35	TREE	ACENEG	20
RAPID CREEK	33	FORB	HERSPH	0.5	RAPID CREEK	35	SHRUB	BETOC	20
RAPID CREEK	33	FORB	LATOCH	0.5	RAPID CREEK	35	SHRUB	FRAVES	0.5
RAPID CREEK	33	FORB	MENARV	0.5	RAPID CREEK	35	SHRUB	RIBSPP	0.5
RAPID CREEK	33	FORB	POTARG	0.5	RAPID CREEK	35	GRAM.	BROCIL	0.5
RAPID CREEK	33	FORB	POTSPP	0.5	RAPID CREEK	35	GRAM.	CARSPP	2.5
RAPID CREEK	33	FORB	RANSPP	0.5	RAPID CREEK	35	GRAM.	ELYVIR	0.5
RAPID CREEK	33	FORB	RUDHIR	0.5	RAPID CREEK	35	GRAM.	MUHRAC	0.5
RAPID CREEK	33	FORB	SMISTE	0.5	RAPID CREEK	35	GRAM.	POAPAL	0.5
RAPID CREEK	33	FORB	TAROFF	0.5	RAPID CREEK	35	GRAM.	POAPRA	60
RAPID CREEK	33	FORB	THASPP	0.5	RAPID CREEK	35	FORB	AGRSTR	0.5
RAPID CREEK	33	FORB	VIOMAP	0.5	RAPID CREEK	35	FORB	CIRVUL	0.5
RAPID CREEK	34	TREE	ACENEG	2.5	RAPID CREEK	35	FORB	CONARV	0.5
RAPID CREEK	34	SHRUB	AMEALN	0.5	RAPID CREEK	35	FORB	CYNOFF	0.5
RAPID CREEK	34	SHRUB	BETOC	70	RAPID CREEK	35	FORB	HERSPH	0.5
RAPID CREEK	34	SHRUB	CORCOR	0.5	RAPID CREEK	35	FORB	MENARV	0.5
RAPID CREEK	34	SHRUB	CORSTO	2.5	RAPID CREEK	35	FORB	OXASTR	0.5
RAPID CREEK	34	SHRUB	FRAVES	2.5	RAPID CREEK	35	FORB	POTNOR	0.5
RAPID CREEK	34	SHRUB	PHYMON	0.5	RAPID CREEK	35	FORB	PTEAQU	80
RAPID CREEK	34	SHRUB	PRUVIR	2.5	RAPID CREEK	35	FORB	RUDLAC	0.5
RAPID CREEK	34	SHRUB	RIBSPP	2.5	RAPID CREEK	35	FORB	SMISTE	0.5
RAPID CREEK	34	SHRUB	ROSWOO	0.5	RAPID CREEK	35	FORB	SOLGIG	0.5
RAPID CREEK	34	SHRUB	RUBIDA	0.5	RAPID CREEK	35	FORB	URTDIO	0.5
RAPID CREEK	34	SHRUB	SALAMY	2.5	RAPID CREEK	35	FORB	VIOSPP	0.5
RAPID CREEK	34	SHRUB	SYMOCC	2.5	RAPID CREEK	36	TREE	BETPAP	20
RAPID CREEK	34	SHRUB	TOXRYD	0.5	RAPID CREEK	36	SHRUB	AMEALN	0.5
RAPID CREEK	34	GRAM.	AGRCAN	0.5	RAPID CREEK	36	SHRUB	BETOC	80
RAPID CREEK	34	GRAM.	AGRREP	0.5	RAPID CREEK	36	SHRUB	CORCOR	2.5
RAPID CREEK	34	GRAM.	BROCIL	2.5	RAPID CREEK	36	SHRUB	CORSTO	0.5
RAPID CREEK	34	GRAM.	CARDIS	0.5	RAPID CREEK	36	SHRUB	FRAVES	0.5
RAPID CREEK	34	GRAM.	CARDIS	10	RAPID CREEK	36	SHRUB	LONDIO	0.5
RAPID CREEK	34	GRAM.	CARSPP	2.5	RAPID CREEK	36	SHRUB	PHYMON	0.5
RAPID CREEK	34	GRAM.	CARSPP	2.5	RAPID CREEK	36	SHRUB	PRUVIR	0.5
RAPID CREEK	34	GRAM.	ELYVIR	0.5	RAPID CREEK	36	SHRUB	RIBSPP	0.5
RAPID CREEK	34	GRAM.	MUHRAC	0.5	RAPID CREEK	36	SHRUB	RIBSPP	0.5
RAPID CREEK	34	GRAM.	POAPAL	0.5	RAPID CREEK	36	SHRUB	ROSWOO	0.5
RAPID CREEK	34	GRAM.	POAPRA	20	RAPID CREEK	36	SHRUB	RUBIDA	0.5
RAPID CREEK	34	GRAM.	SCHPUR	0.5	RAPID CREEK	36	SHRUB	SHECAN	0.5
RAPID CREEK	34	FORB	ACHMIL	0.5	RAPID CREEK	36	SHRUB	SYMOCC	0.5
RAPID CREEK	34	FORB	ASTSPP	0.5	RAPID CREEK	36	GRAM.	BROCIL	0.5
RAPID CREEK	34	FORB	CIRVUL	0.5	RAPID CREEK	36	GRAM.	ALCAN	0.5
RAPID CREEK	34	FORB	CYNOFF	0.5	RAPID CREEK	36	GRAM.	CARSPP	0.5
RAPID CREEK	34	FORB	EQUARV	0.5	RAPID CREEK	36	GRAM.	POAPAL	0.5
RAPID CREEK	34	FORB	GALBOR	0.5	RAPID CREEK	36	GRAM.	POAPRA	2.5
RAPID CREEK	34	FORB	GALTRI	0.5	RAPID CREEK	36	FORB	ARANUD	10
RAPID CREEK	34	FORB	LATOCH	0.5	RAPID CREEK	36	FORB	CIRVUL	0.5
RAPID CREEK	34	FORB	MELOFF	0.5	RAPID CREEK	36	FORB	EUPMAC	0.5
RAPID CREEK	34	FORB	MONFIS	0.5	RAPID CREEK	36	FORB	GALBOR	0.5
RAPID CREEK	34	FORB	OXASTR	0.5	RAPID CREEK	36	FORB	GALTRI	0.5
RAPID CREEK	34	FORB	RUDLAC	0.5	RAPID CREEK	36	FORB	LATOCH	0.5
RAPID CREEK	34	FORB	SMISTE	0.5	RAPID CREEK	36	FORB	LATOCH	0.5
RAPID CREEK	34	FORB	SOLGIG	2.5	RAPID CREEK	36	FORB	MAICAN	0.5
RAPID CREEK	34	FORB	SONASP	0.5	RAPID CREEK	36	FORB	RUDLAC	0.5
RAPID CREEK	34	FORB	TRIHVB	0.5	RAPID CREEK	36	FORB	RUDLAC	0.5
RAPID CREEK	34	FORB	VERTHA	0.5	RAPID CREEK	36	FORB	SMISTE	0.5
RAPID CREEK	34	FORB	VICAME	0.5	RAPID CREEK	36	FORB	SOLRID	0.5

DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER	DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER
RAPID CREEK	36	FORB	SOLSPP	0.5	RAPID CREEK	40	SHRUB	SALPLA	20
RAPID CREEK	36	FORB	STRAMP	0.5	RAPID CREEK	40	GRAM.	AGRSPP	0.5
RAPID CREEK	36	FORB	THADAS	0.5	RAPID CREEK	40	GRAM.	CALCAN	10
RAPID CREEK	39	TREE	PICGLA	60	RAPID CREEK	40	GRAM.	CALINE	0.5
RAPID CREEK	39	SHRUB	CORSTO	10	RAPID CREEK	40	GRAM.	CARATH	60
RAPID CREEK	39	SHRUB	LONDIO	0.5	RAPID CREEK	40	GRAM.	CATAQU	0.5
RAPID CREEK	39	SHRUB	PRUVIR	10	RAPID CREEK	40	GRAM.	GLYGRA	0.5
RAPID CREEK	39	SHRUB	RIBSPP	10	RAPID CREEK	40	GRAM.	GLYSTR	2.5
RAPID CREEK	39	SHRUB	ROSWO	2.5	RAPID CREEK	40	GRAM.	PHLPRA	0.5
RAPID CREEK	39	SHRUB	RUBIDA	0.5	RAPID CREEK	40	GRAM.	POAPRA	2.5
RAPID CREEK	39	SHRUB	RUBPUB	0.5	RAPID CREEK	40	FORB	ACOCOL	0.5
RAPID CREEK	39	SHRUB	SAMCAN	20	RAPID CREEK	40	FORB	ASTJUN	0.5
RAPID CREEK	39	SHRUB	SYMALB	2.5	RAPID CREEK	40	FORB	ASTMER	0.5
RAPID CREEK	39	GRAM.	BROCIL	0.5	RAPID CREEK	40	FORB	ASTSPP	0.5
RAPID CREEK	39	GRAM.	CARSPP	0.5	RAPID CREEK	40	FORB	CICDOU	0.5
RAPID CREEK	39	GRAM.	CARSPP	2.5	RAPID CREEK	40	FORB	CIRSPP	0.5
RAPID CREEK	39	GRAM.	CATAQU	2.5	RAPID CREEK	40	FORB	EPIANG	0.5
RAPID CREEK	39	GRAM.	ELYVIR	0.5	RAPID CREEK	40	FORB	EQUASYL	10
RAPID CREEK	39	GRAM.	ELYVIR	0.5	RAPID CREEK	40	FORB	GALBOR	0.5
RAPID CREEK	39	GRAM.	ORYASP	0.5	RAPID CREEK	40	FORB	GERRIC	0.5
RAPID CREEK	39	GRAM.	PHLPRA	0.5	RAPID CREEK	40	FORB	HALDEF	0.5
RAPID CREEK	39	GRAM.	POAPAL	0.5	RAPID CREEK	40	FORB	HERSPH	0.5
RAPID CREEK	39	FORB	ACOCOL	2.5	RAPID CREEK	40	FORB	MENARV	0.5
RAPID CREEK	39	FORB	ACTRUB	2.5	RAPID CREEK	40	FORB	POTNOR	0.5
RAPID CREEK	39	FORB	ARANUD	2.5	RAPID CREEK	40	FORB	PYRSPP	0.5
RAPID CREEK	39	FORB	ASTSPP	0.5	RAPID CREEK	40	FORB	RUDHIR	0.5
RAPID CREEK	39	FORB	ASTSPP	0.5	RAPID CREEK	40	FORB	RUMCRI	0.5
RAPID CREEK	39	FORB	CICDIO	0.5	RAPID CREEK	40	FORB	SMISTE	0.5
RAPID CREEK	39	FORB	CLEOCC	0.5	RAPID CREEK	40	FORB	SOLGIG	0.5
RAPID CREEK	39	FORB	DISTRA	0.5	RAPID CREEK	40	FORB	TAROFF	0.5
RAPID CREEK	39	FORB	FRAVES	0.5	RAPID CREEK	40	FORB	TRIREP	0.5
RAPID CREEK	39	FORB	GALTRI	10	RAPID CREEK	40	FORB	VICAME	0.5
RAPID CREEK	39	FORB	GERRIC	0.5	RAPID CREEK	40	FORB	ZIZAPT	2.5
RAPID CREEK	39	FORB	GLYSTR	0.5	RAPID CREEK	41	SHRUB	SALLUT	0.5
RAPID CREEK	39	FORB	HACDEF	0.5	RAPID CREEK	41	GRAM.	AGRHYE	20
RAPID CREEK	39	FORB	HEURIC	0.5	RAPID CREEK	41	GRAM.	CARROS	30
RAPID CREEK	39	FORB	LATOCH	2.5	RAPID CREEK	41	GRAM.	SCISPP	10
RAPID CREEK	39	FORB	LINBOR	10	RAPID CREEK	41	GRAM.	TYPLAT	40
RAPID CREEK	39	FORB	MENARV	2.5	RAPID CREEK	41	FORB	ASTJUN	0.5
RAPID CREEK	39	FORB	OSMLON	2.5	RAPID CREEK	41	FORB	CICDIO	0.5
RAPID CREEK	39	FORB	POTNOR	0.5	RAPID CREEK	41	FORB	EQUOSP	10
RAPID CREEK	39	FORB	RUDLAC	0.5	RAPID CREEK	41	FORB	RUMCRI	0.5
RAPID CREEK	39	FORB	RUMCRI	0.5	RAPID CREEK	41	FORB	VIOSPP	0.5
RAPID CREEK	39	FORB	SANMAR	0.5	RAPID CREEK	42	TREE	PICGLA	30
RAPID CREEK	39	FORB	SMIRAC	0.5	RAPID CREEK	42	TREE	POPTRE	20
RAPID CREEK	39	FORB	SMISTE	0.5	RAPID CREEK	42	SHRUB	AMEALN	0.5
RAPID CREEK	39	FORB	STELON	0.5	RAPID CREEK	42	SHRUB	BETOC	20
RAPID CREEK	39	FORB	THASPP	0.5	RAPID CREEK	42	SHRUB	CORCAN	0.5
RAPID CREEK	39	FORB	URTDIO	0.5	RAPID CREEK	42	SHRUB	CORSTO	2.5
RAPID CREEK	39	FORB	VIOCAN	2.5	RAPID CREEK	42	SHRUB	PRUVIR	20
RAPID CREEK	40	TREE	PICGLA	40	RAPID CREEK	42	SHRUB	RIBSPP	0.5
RAPID CREEK	40	SHRUB	CORSTO	10	RAPID CREEK	42	SHRUB	ROSWO	2.5
RAPID CREEK	40	SHRUB	RIBSPP	2.5	RAPID CREEK	42	SHRUB	SALBEB	2.5
RAPID CREEK	40	SHRUB	ROSWO	10	RAPID CREEK	42	SHRUB	SALCOR	2.5
RAPID CREEK	40	SHRUB	RUBPUB	2.5	RAPID CREEK	42	SHRUB	SYMOC	2.5
RAPID CREEK	40	SHRUB	SALBEB	0.5	RAPID CREEK	42	GRAM.	AGRSTO	2.5
RAPID CREEK	40	SHRUB	SALLUT	0.5	RAPID CREEK	42	GRAM.	BROCIL	2.5

DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER	DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER
RAPID CREEK	42	GRAM.	EQUARV	2.5	RAPID CREEK	44	SHRUB	SALCAN	0.5
RAPID CREEK	42	GRAM.	PHLPRA	20	RAPID CREEK	44	SHRUB	SALLUT	0.5
RAPID CREEK	42	GRAM.	POAPAL	10	RAPID CREEK	44	GRAM.	AGRREP	2.5
RAPID CREEK	42	GRAM.	POAPRA	60	RAPID CREEK	44	GRAM.	BROCIL	0.5
RAPID CREEK	42	FORB	ACHMIL	0.5	RAPID CREEK	44	GRAM.	CALCAN	2.5
RAPID CREEK	42	FORB	ASTLAE	0.5	RAPID CREEK	44	GRAM.	CARDEW	30
RAPID CREEK	42	FORB	ASTLAE	10	RAPID CREEK	44	GRAM.	CARNEB	2.5
RAPID CREEK	42	FORB	CIOQDIO	0.5	RAPID CREEK	44	GRAM.	CARSPP	30
RAPID CREEK	42	FORB	GALBOR	0.5	RAPID CREEK	44	GRAM.	JUNBAL	0.5
RAPID CREEK	42	FORB	GALTRI	0.5	RAPID CREEK	44	GRAM.	MUHRAC	0.5
RAPID CREEK	42	FORB	GERRIC	0.5	RAPID CREEK	44	GRAM.	PHLPRA	0.5
RAPID CREEK	42	FORB	HERSPH	2.5	RAPID CREEK	44	GRAM.	POAPAL	0.5
RAPID CREEK	42	FORB	LYSCIL	0.5	RAPID CREEK	44	GRAM.	POAPRA	0.5
RAPID CREEK	42	FORB	MAICAN	0.5	RAPID CREEK	44	FORB	ASTSPP	0.5
RAPID CREEK	42	FORB	MENARV	0.5	RAPID CREEK	44	FORB	GENPUB	0.5
RAPID CREEK	42	FORB	PRUVUL	0.5	RAPID CREEK	44	FORB	GENPUB	0.5
RAPID CREEK	42	FORB	PYRSPP	0.5	RAPID CREEK	44	FORB	SOLCAN	0.5
RAPID CREEK	42	FORB	RUDHIR	2.5	BATTLE CREEK	12	TREE	POPTRE	0.5
RAPID CREEK	42	FORB	SMISTE	0.5	BATTLE CREEK	12	TREE	BETPAP	0.5
RAPID CREEK	42	FORB	SOLCAN	0.5	BATTLE CREEK	12	TREE	PINPON	10
RAPID CREEK	42	FORB	TAROFF	2.5	BATTLE CREEK	12	SHRUB	AGRSTR	2.5
RAPID CREEK	42	FORB	THADAS	0.5	BATTLE CREEK	12	SHRUB	BETOCC	2.5
RAPID CREEK	42	FORB	THASPP	0.5	BATTLE CREEK	12	SHRUB	CORSTO	2.5
RAPID CREEK	42	FORB	VICAME	0.5	BATTLE CREEK	12	SHRUB	MONFIS	0.5
RAPID CREEK	42	FORB	VIOCAN	0.5	BATTLE CREEK	12	SHRUB	PHYMON	2.5
RAPID CREEK	43	TREE	PICGLA	0.5	BATTLE CREEK	12	SHRUB	ROSWOO	0.5
RAPID CREEK	43	SHRUB	BETOCC	0.5	BATTLE CREEK	12	SHRUB	RUBIDA	10
RAPID CREEK	43	SHRUB	POTFRU	20	BATTLE CREEK	12	SHRUB	SALBEB	10
RAPID CREEK	43	SHRUB	RIBSPP	0.5	BATTLE CREEK	12	SHRUB	SALLUT	2.5
RAPID CREEK	43	SHRUB	SALBEB	2.5	BATTLE CREEK	12	SHRUB	SYMOC	0.5
RAPID CREEK	43	SHRUB	SALCAN	20	BATTLE CREEK	12	GRAM.	AGRSTO	10
RAPID CREEK	43	SHRUB	SALLUT	10	BATTLE CREEK	12	GRAM.	CAREMO	0.5
RAPID CREEK	43	GRAM.	AGRREP	0.5	BATTLE CREEK	12	GRAM.	CARINT	2.5
RAPID CREEK	43	GRAM.	BROCIL	0.5	BATTLE CREEK	12	GRAM.	CARMIC	2.5
RAPID CREEK	43	GRAM.	CARNEB	0.5	BATTLE CREEK	12	GRAM.	CARSTI	0.5
RAPID CREEK	43	GRAM.	CARROS	20	BATTLE CREEK	12	GRAM.	POAPRA	30
RAPID CREEK	43	GRAM.	JUNBAL	0.5	BATTLE CREEK	12	FORB	ACHLAN	0.5
RAPID CREEK	43	GRAM.	MUHRAC	0.5	BATTLE CREEK	12	FORB	CICMAC	0.5
RAPID CREEK	43	GRAM.	POAPRA	60	BATTLE CREEK	12	FORB	CIRVUL	0.5
RAPID CREEK	43	FORB	ACHMIL	0.5	BATTLE CREEK	12	FORB	EQUARV	0.5
RAPID CREEK	43	FORB	ASTSPP	0.5	BATTLE CREEK	12	FORB	GALTRI	0.5
RAPID CREEK	43	FORB	CIRVUL	0.5	BATTLE CREEK	12	FORB	GERRIC	0.5
RAPID CREEK	43	FORB	CYNOFF	0.5	BATTLE CREEK	12	FORB	HERSPH	10
RAPID CREEK	43	FORB	FRAVES	0.5	BATTLE CREEK	12	FORB	LYSCIL	0.5
RAPID CREEK	43	FORB	GENPUB	0.5	BATTLE CREEK	12	FORB	NEPCAT	0.5
RAPID CREEK	43	FORB	POTNOR	0.5	BATTLE CREEK	12	FORB	ONOSEN	2.5
RAPID CREEK	43	FORB	RUDHIR	0.5	BATTLE CREEK	12	FORB	POTQUI	0.5
RAPID CREEK	43	FORB	SOLSPP	0.5	BATTLE CREEK	12	FORB	RUDLAC	0.5
RAPID CREEK	43	FORB	STAPAL	0.5	BATTLE CREEK	12	FORB	SCIMIC	100
RAPID CREEK	44	TREE	PICGLA	20	BATTLE CREEK	12	FORB	SOLGIG	0.5
RAPID CREEK	44	TREE	POPTRE	2.5	BATTLE CREEK	12	FORB	STELON	0.5
RAPID CREEK	44	SHRUB	BETOCC	0.5	BATTLE CREEK	12	FORB	TAROFF	10
RAPID CREEK	44	SHRUB	CORSTO	0.5	BATTLE CREEK	12	FORB	THASPP	2.5
RAPID CREEK	44	SHRUB	FRAVES	0.5	BATTLE CREEK	12	FORB	TRIPRA	2.5
RAPID CREEK	44	SHRUB	POTFRU	10	BATTLE CREEK	12	FORB	TRIREP	10
RAPID CREEK	44	SHRUB	RIBSPP	0.5	BATTLE CREEK	12	FORB	VICAME	0.5
RAPID CREEK	44	SHRUB	SALBEB	0.5	BATTLE CREEK	13	TREE	PINPON	20

DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER	DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER
BATTLE CREEK	13	TREE	QUEMAC	50	BATTLE CREEK	14	FORB	ARANUD	2.5
BATTLE CREEK	13	SHRUB	AMEALN	0.5	BATTLE CREEK	14	FORB	GALBOR	2.5
BATTLE CREEK	13	SHRUB	CORCOR	60	BATTLE CREEK	14	FORB	GALTRI	0.5
BATTLE CREEK	13	SHRUB	LONDIO	10	BATTLE CREEK	14	FORB	HERSPH	2.5
BATTLE CREEK	13	SHRUB	PHYMON	10	BATTLE CREEK	14	FORB	MAICAN	0.5
BATTLE CREEK	13	SHRUB	PRUVIR	10	BATTLE CREEK	14	FORB	RUDHIR	0.5
BATTLE CREEK	13	SHRUB	RIBSPP	10	BATTLE CREEK	14	FORB	SMISTE	0.5
BATTLE CREEK	13	SHRUB	RUBIDE	10	BATTLE CREEK	14	FORB	SOLSPP	0.5
BATTLE CREEK	13	SHRUB	SYMOCC	2.5	BATTLE CREEK	14	FORB	TAROFF	0.5
BATTLE CREEK	13	SHRUB	TOXRYD	20	BATTLE CREEK	14	FORB	THASPP	2.5
BATTLE CREEK	13	GRAM.	AGRSTO	10	BATTLE CREEK	14	FORB	VICAME	0.5
BATTLE CREEK	13	GRAM.	BROINE	10	BATTLE CREEK	14	FORB	VIOSPP	2.5
BATTLE CREEK	13	GRAM.	CARBEB	0.5	BATTLE CREEK	15	TREE	POPTRE	10
BATTLE CREEK	13	GRAM.	CARFOE	0.5	BATTLE CREEK	15	SHRUB	CORSTO	0.5
BATTLE CREEK	13	GRAM.	CARSPP	2.5	BATTLE CREEK	15	SHRUB	SALBEB	10
BATTLE CREEK	13	GRAM.	LZCAM	0.5	BATTLE CREEK	15	SHRUB	SALINT	40
BATTLE CREEK	13	GRAM.	PANLEI	0.5	BATTLE CREEK	15	GRAM.	BROINE	0.5
BATTLE CREEK	13	GRAM.	POAPRA	20	BATTLE CREEK	15	GRAM.	CARHAY	2.5
BATTLE CREEK	13	GRAM.	SCHPUR	0.5	BATTLE CREEK	15	GRAM.	CARINT	2.5
BATTLE CREEK	13	FORB	ACTRUB	2.5	BATTLE CREEK	15	GRAM.	PHLPRA	2.5
BATTLE CREEK	13	FORB	APOAND	2.5	BATTLE CREEK	15	GRAM.	POAPAL	40
BATTLE CREEK	13	FORB	BRASPP	0.5	BATTLE CREEK	15	GRAM.	POAPRA	0.5
BATTLE CREEK	13	FORB	EQUARV	0.5	BATTLE CREEK	15	GRAM.	SCIMIC	2.5
BATTLE CREEK	13	FORB	GALBOR	2.5	BATTLE CREEK	15	GRAM.	SOLSPP	2.5
BATTLE CREEK	13	FORB	GALTRI	0.5	BATTLE CREEK	15	FORB	AGRSTR	0.5
BATTLE CREEK	13	FORB	HERSPH	10	BATTLE CREEK	15	FORB	BRASPP	0.5
BATTLE CREEK	13	FORB	LACBIE	0.5	BATTLE CREEK	15	FORB	CICDOU	0.5
BATTLE CREEK	13	FORB	MAICAN	0.5	BATTLE CREEK	15	FORB	CIRVUL	0.5
BATTLE CREEK	13	FORB	MENARV	2.5	BATTLE CREEK	15	FORB	EQUARV	60
BATTLE CREEK	13	FORB	MONFIS	0.5	BATTLE CREEK	15	FORB	FRAVIR	0.5
BATTLE CREEK	13	FORB	OSMLON	10	BATTLE CREEK	15	FORB	GALBOR	0.5
BATTLE CREEK	13	FORB	SANMAR	2.5	BATTLE CREEK	15	FORB	GEUALE	0.5
BATTLE CREEK	13	FORB	SMIRAC	2.5	BATTLE CREEK	15	FORB	HALDEF	0.5
BATTLE CREEK	13	FORB	THASPP	10	BATTLE CREEK	15	FORB	HERSPH	0.5
BATTLE CREEK	13	FORB	TRADUB	0.5	BATTLE CREEK	15	FORB	ONosen	10
BATTLE CREEK	13	FORB	TRIREP	0.5	BATTLE CREEK	15	FORB	OXASTR	0.5
BATTLE CREEK	13	FORB	VICAME	2.5	BATTLE CREEK	15	FORB	RUDHIR	0.5
BATTLE CREEK	13	FORB	VIOSPP	2.5	BATTLE CREEK	15	FORB	RUMCRI	0.5
BATTLE CREEK	14	TREE	BETPAP	30	BATTLE CREEK	15	FORB	TAROFF	0.5
BATTLE CREEK	14	TREE	PICGLA	2.5	BATTLE CREEK	15	FORB	THASPP	0.5
BATTLE CREEK	14	TREE	PINPON	20	BATTLE CREEK	15	FORB	TRIREP	2.5
BATTLE CREEK	14	TREE	POPTRE	2.5	BATTLE CREEK	15	FORB	VERTHA	0.5
BATTLE CREEK	14	TREE	QUEMAC	10	BATTLE CREEK	15	FORB	VICAME	0.5
BATTLE CREEK	14	SHRUB	AMEALN	2.5	BATTLE CREEK	16	TREE	PINPON	40
BATTLE CREEK	14	SHRUB	CORCOR	70	BATTLE CREEK	16	TREE	QUEMAC	0.5
BATTLE CREEK	14	SHRUB	RIBSPP	0.5	BATTLE CREEK	16	SHRUB	PHYMON	10
BATTLE CREEK	14	SHRUB	ROSWOO	0.5	BATTLE CREEK	16	SHRUB	ROSWOO	0.5
BATTLE CREEK	14	SHRUB	RUBSPP	0.5	BATTLE CREEK	16	SHRUB	RUBIDA	2.5
BATTLE CREEK	14	SHRUB	SYMOCC	2.5	BATTLE CREEK	16	SHRUB	RUBPAR	2.5
BATTLE CREEK	14	SHRUB	TOXRYD	20	BATTLE CREEK	16	SHRUB	SALBEB	0.5
BATTLE CREEK	14	GRAM.	BROINE	10	BATTLE CREEK	16	SHRUB	SALINT	2.5
BATTLE CREEK	14	GRAM.	CARFOE	2.5	BATTLE CREEK	16	SHRUB	SYMOCC	10
BATTLE CREEK	14	GRAM.	CARSPP	60	BATTLE CREEK	16	GRAM.	AGRCAN	0.5
BATTLE CREEK	14	GRAM.	POAPAL	0.5	BATTLE CREEK	16	GRAM.	BROINE	2.5
BATTLE CREEK	14	GRAM.	POAPRA	10	BATTLE CREEK	16	GRAM.	CARDEW	30
BATTLE CREEK	14	GRAM.	SCHPUR	10	BATTLE CREEK	16	GRAM.	CARSPP	10
BATTLE CREEK	14	FORB	APOAND	2.5	BATTLE CREEK	16	GRAM.	ELYVIR	2.5

DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER	DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER
BATTLE CREEK	16	GRAM.	PANLEI	0.5	BATTLE CREEK	18	SHRUB	CORCOR	20
BATTLE CREEK	16	GRAM.	PHLPRA	0.5	BATTLE CREEK	18	SHRUB	JUNCOM	0.5
BATTLE CREEK	16	GRAM.	POAPAL	30	BATTLE CREEK	18	SHRUB	LINBOR	20
BATTLE CREEK	16	GRAM.	POAPRA	2.5	BATTLE CREEK	18	SHRUB	PRUVIR	0.5
BATTLE CREEK	16	FORB	ACHMIL	0.5	BATTLE CREEK	18	SHRUB	RIBSPP	0.5
BATTLE CREEK	16	FORB	AGRSTR	0.5	BATTLE CREEK	18	SHRUB	ROSWOO	0.5
BATTLE CREEK	16	FORB	ATHFIL	0.5	BATTLE CREEK	18	SHRUB	SPIBET	0.5
BATTLE CREEK	16	FORB	CICDOU	0.5	BATTLE CREEK	18	SHRUB	SYMOC	2.5
BATTLE CREEK	16	FORB	CIRVUL	0.5	BATTLE CREEK	18	GRAM.	BROINE	0.5
BATTLE CREEK	16	FORB	EQUALAE	0.5	BATTLE CREEK	18	GRAM.	CARFOE	0.5
BATTLE CREEK	16	FORB	GERSPP	0.5	BATTLE CREEK	18	GRAM.	CARSPP	10
BATTLE CREEK	16	FORB	HALDEF	0.5	BATTLE CREEK	18	GRAM.	ORYASP	2.5
BATTLE CREEK	16	FORB	HERSPH	0.5	BATTLE CREEK	18	GRAM.	POAPAL	0.5
BATTLE CREEK	16	FORB	HUMLUP	2.5	BATTLE CREEK	18	GRAM.	POAPRA	0.5
BATTLE CREEK	16	FORB	MAICAN	0.5	BATTLE CREEK	18	GRAM.	SCHPUR	2.5
BATTLE CREEK	16	FORB	RUDHIR	2.5	BATTLE CREEK	18	FORB	ACHMIL	0.5
BATTLE CREEK	16	FORB	TAROFF	0.5	BATTLE CREEK	18	FORB	ANTSPP	0.5
BATTLE CREEK	16	FORB	THASPP	0.5	BATTLE CREEK	18	FORB	ARANUD	20
BATTLE CREEK	16	FORB	TRIREP	0.5	BATTLE CREEK	18	FORB	CORCAN	0.5
BATTLE CREEK	16	FORB	VERTHA	0.5	BATTLE CREEK	18	FORB	CORSPP	0.5
BATTLE CREEK	16	FORB	VICAME	0.5	BATTLE CREEK	18	FORB	EQUUSY	0.5
BATTLE CREEK	16	FORB	VIOSPP	0.5	BATTLE CREEK	18	FORB	GALBOR	2.5
BATTLE CREEK	17	TREE	PICGLA	80	BATTLE CREEK	18	FORB	GALTRI	0.5
BATTLE CREEK	17	SHRUB	CARFOE	0.5	BATTLE CREEK	18	FORB	HALDEF	0.5
BATTLE CREEK	17	SHRUB	CORCOR	40	BATTLE CREEK	18	FORB	MAICAN	20
BATTLE CREEK	17	SHRUB	CORSTO	2.5	BATTLE CREEK	18	FORB	RUDLAC	0.5
BATTLE CREEK	17	SHRUB	LONDIO	2.5	BATTLE CREEK	18	FORB	SMISTE	0.5
BATTLE CREEK	17	SHRUB	PRUVIR	0.5	BATTLE CREEK	18	FORB	SOLSPP	0.5
BATTLE CREEK	17	SHRUB	ROSWOO	0.5	BATTLE CREEK	18	FORB	THASPP	0.5
BATTLE CREEK	17	SHRUB	SHECAN	0.5	BATTLE CREEK	19	TREE	BETOC	2.5
BATTLE CREEK	17	SHRUB	SPIBET	2.5	BATTLE CREEK	19	TREE	BETPAP	2.5
BATTLE CREEK	17	SHRUB	SYMOC	0.5	BATTLE CREEK	19	TREE	PICGLA	20
BATTLE CREEK	17	GRAM.	AGRSTO	0.5	BATTLE CREEK	19	TREE	PINPON	0.5
BATTLE CREEK	17	GRAM.	CARSPP	2.5	BATTLE CREEK	19	TREE	POPTRE	0.5
BATTLE CREEK	17	GRAM.	ORYASP	2.5	BATTLE CREEK	19	SHRUB	AMEALN	0.5
BATTLE CREEK	17	GRAM.	POAPRA	0.5	BATTLE CREEK	19	SHRUB	ARCUVA	0.5
BATTLE CREEK	17	GRAM.	SCHPUR	2.5	BATTLE CREEK	19	SHRUB	CORCOR	2.5
BATTLE CREEK	17	FORB	ACHMIL	0.5	BATTLE CREEK	19	SHRUB	CORSTO	2.5
BATTLE CREEK	17	FORB	ANTSPP	0.5	BATTLE CREEK	19	SHRUB	FRAVES	0.5
BATTLE CREEK	17	FORB	APOSIB	0.5	BATTLE CREEK	19	SHRUB	PHYMON	0.5
BATTLE CREEK	17	FORB	ARANUD	10	BATTLE CREEK	19	SHRUB	RIBSPP	0.5
BATTLE CREEK	17	FORB	FRAVES	2.5	BATTLE CREEK	19	SHRUB	ROSWOO	0.5
BATTLE CREEK	17	FORB	GALBOR	0.5	BATTLE CREEK	19	SHRUB	SALBEB	30
BATTLE CREEK	17	FORB	GALTRI	0.5	BATTLE CREEK	19	SHRUB	SALINT	0.5
BATTLE CREEK	17	FORB	HALDEF	0.5	BATTLE CREEK	19	SHRUB	SHECAN	0.5
BATTLE CREEK	17	FORB	LINBOR	20	BATTLE CREEK	19	SHRUB	SYMALB	0.5
BATTLE CREEK	17	FORB	MAICAN	2.5	BATTLE CREEK	19	GRAM.	BROINE	0.5
BATTLE CREEK	17	FORB	PYRSPP	0.5	BATTLE CREEK	19	GRAM.	CARDIS	0.5
BATTLE CREEK	17	FORB	SMISTE	2.5	BATTLE CREEK	19	GRAM.	CARINT	0.5
BATTLE CREEK	17	FORB	SOLSPP	0.5	BATTLE CREEK	19	GRAM.	EQUUSP	30
BATTLE CREEK	17	FORB	TAROFF	0.5	BATTLE CREEK	19	GRAM.	FESPPRA	0.5
BATTLE CREEK	17	FORB	THASPP	0.5	BATTLE CREEK	19	GRAM.	GLYSTR	0.5
BATTLE CREEK	17	FORB	VICAME	0.5	BATTLE CREEK	19	GRAM.	LUZCAM	0.5
BATTLE CREEK	17	FORB	VIOSPP	0.5	BATTLE CREEK	19	GRAM.	PHLPRA	0.5
BATTLE CREEK	18	TREE	PICGLA	50	BATTLE CREEK	19	GRAM.	POAPAL	2.5
BATTLE CREEK	18	TREE	PINPON	30	BATTLE CREEK	19	GRAM.	POAPRA	2.5
BATTLE CREEK	18	SHRUB	AMEALN	0.5	BATTLE CREEK	19	FORB	ACHMIL	0.5



DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER	DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER
BATTLE CREEK	19	FORB	AGRSTR	0.5	BATTLE CREEK	20	FORB	HERSPH	0.5
BATTLE CREEK	19	FORB	APOAND	0.5	BATTLE CREEK	20	FORB	LATOCH	0.5
BATTLE CREEK	19	FORB	APOCAN	0.5	BATTLE CREEK	20	FORB	LYSCIL	0.5
BATTLE CREEK	19	FORB	ARANUD	0.5	BATTLE CREEK	20	FORB	MAICAN	2.5
BATTLE CREEK	19	FORB	CICDOU	2.5	BATTLE CREEK	20	FORB	MONFIS	0.5
BATTLE CREEK	19	FORB	EUPMAC	0.5	BATTLE CREEK	20	FORB	OSMLON	2.5
BATTLE CREEK	19	FORB	GALTRI	0.5	BATTLE CREEK	20	FORB	SANMAR	0.5
BATTLE CREEK	19	FORB	GERSPP	2.5	BATTLE CREEK	20	FORB	SCUGAL	0.5
BATTLE CREEK	19	FORB	HALDEF	0.5	BATTLE CREEK	20	FORB	SMIHER	0.5
BATTLE CREEK	19	FORB	HERSPH	2.5	BATTLE CREEK	20	FORB	SMIRAC	0.5
BATTLE CREEK	19	FORB	LACBIE	0.5	BATTLE CREEK	20	FORB	SMISTE	2.5
BATTLE CREEK	19	FORB	LATOCH	0.5	BATTLE CREEK	20	FORB	SOLCAN	0.5
BATTLE CREEK	19	FORB	LINBOR	2.5	BATTLE CREEK	20	FORB	THADAS	2.5
BATTLE CREEK	19	FORB	MONFIS	0.5	BATTLE CREEK	20	FORB	VICAME	0.5
BATTLE CREEK	19	FORB	ONOSEN	10	BATTLE CREEK	20	FORB	VIOSPP	0.5
BATTLE CREEK	19	FORB	OXASTR	0.5	BATTLE CREEK	21	TREE	PICGLA	0.5
BATTLE CREEK	19	FORB	PRUVUL	0.5	BATTLE CREEK	21	TREE	QUEMAC	0.5
BATTLE CREEK	19	FORB	PTEAQU	2.5	BATTLE CREEK	21	SHRUB	CORSTO	0.5
BATTLE CREEK	19	FORB	PYRSPP	0.5	BATTLE CREEK	21	SHRUB	FRAVIR	0.5
BATTLE CREEK	19	FORB	SANMAR	0.5	BATTLE CREEK	21	SHRUB	PHYMON	2.5
BATTLE CREEK	19	FORB	SOLSPP	2.5	BATTLE CREEK	21	SHRUB	RIBSPP	0.5
BATTLE CREEK	19	FORB	TAROFF	0.5	BATTLE CREEK	21	SHRUB	ROSWOO	0.5
BATTLE CREEK	19	FORB	THADAS	0.5	BATTLE CREEK	21	SHRUB	SALBEB	0.5
BATTLE CREEK	19	FORB	TRIPRA	0.5	BATTLE CREEK	21	SHRUB	SALINT	2.5
BATTLE CREEK	19	FORB	TRIREP	2.5	BATTLE CREEK	21	SHRUB	TOXRYD	2.5
BATTLE CREEK	19	FORB	URTDIO	0.5	BATTLE CREEK	21	GRAM.	AGRSTO	40
BATTLE CREEK	19	FORB	VICAME	0.5	BATTLE CREEK	21	GRAM.	BROCIL	0.5
BATTLE CREEK	19	FORB	VIOSPP	0.5	BATTLE CREEK	21	GRAM.	CARSTO	2.5
BATTLE CREEK	20	TREE	BETPAP	20	BATTLE CREEK	21	GRAM.	DANSPI	0.5
BATTLE CREEK	20	TREE	PINPON	30	BATTLE CREEK	21	GRAM.	PANPER	0.5
BATTLE CREEK	20	TREE	QUEMAC	30	BATTLE CREEK	21	GRAM.	PHLPRA	2.5
BATTLE CREEK	20	SHRUB	AMEALN	2.5	BATTLE CREEK	21	GRAM.	POAPAL	0.5
BATTLE CREEK	20	SHRUB	CORCOR	70	BATTLE CREEK	21	GRAM.	POAPRA	0.5
BATTLE CREEK	20	SHRUB	LONDIO	0.5	BATTLE CREEK	21	FORB	ANEVIR	0.5
BATTLE CREEK	20	SHRUB	PRUVIR	2.5	BATTLE CREEK	21	FORB	APOAND	0.5
BATTLE CREEK	20	SHRUB	RIBSPP	0.5	BATTLE CREEK	21	FORB	ARANUD	0.5
BATTLE CREEK	20	SHRUB	RUBSPP	0.5	BATTLE CREEK	21	FORB	CAMROT	0.5
BATTLE CREEK	20	SHRUB	SYMALB	0.5	BATTLE CREEK	21	FORB	CICDOU	2.5
BATTLE CREEK	20	SHRUB	SYMOC	2.5	BATTLE CREEK	21	FORB	EQUARV	2.5
BATTLE CREEK	20	SHRUB	TOXRYD	0.5	BATTLE CREEK	21	FORB	EQU LAV	0.5
BATTLE CREEK	20	GRAM.	ATHFIL	0.5	BATTLE CREEK	21	FORB	EUPMAC	0.5
BATTLE CREEK	20	GRAM.	BROINE	0.5	BATTLE CREEK	21	FORB	GALBOR	0.5
BATTLE CREEK	20	GRAM.	CARSPP	0.5	BATTLE CREEK	21	FORB	GEUALE	0.5
BATTLE CREEK	20	GRAM.	CARSPP	2.5	BATTLE CREEK	21	FORB	HERSPH	0.5
BATTLE CREEK	20	GRAM.	DANSPI	0.5	BATTLE CREEK	21	FORB	LYCAME	0.5
BATTLE CREEK	20	GRAM.	ORYASP	2.5	BATTLE CREEK	21	FORB	LYSCIL	0.5
BATTLE CREEK	20	GRAM.	POAPAL	0.5	BATTLE CREEK	21	FORB	MONFIS	0.5
BATTLE CREEK	20	GRAM.	POAPRA	10	BATTLE CREEK	21	FORB	OSMLON	0.5
BATTLE CREEK	20	GRAM.	SCHPUR	0.5	BATTLE CREEK	21	FORB	PLAMAJ	0.5
BATTLE CREEK	20	FORB	ACHMIL	0.5	BATTLE CREEK	21	FORB	PRUVUL	0.5
BATTLE CREEK	20	FORB	ANEVIR	0.5	BATTLE CREEK	21	FORB	RUDHIR	0.5
BATTLE CREEK	20	FORB	APOAND	0.5	BATTLE CREEK	21	FORB	RUMEX	0.5
BATTLE CREEK	20	FORB	ARANUD	2.5	BATTLE CREEK	21	FORB	SOLCAN	0.5
BATTLE CREEK	20	FORB	GALBOR	0.5	BATTLE CREEK	21	FORB	TRIPRA	0.5
BATTLE CREEK	20	FORB	GALTRI	0.5	BATTLE CREEK	21	FORB	TRI REP	2.5
BATTLE CREEK	20	FORB	GERRIC	0.5	BATTLE CREEK	21	FORB	URTDIO	0.5
BATTLE CREEK	20	FORB	HACFLO	0.5	BATTLE CREEK	21	FORB	VICAME	0.5

DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER	DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER
BATTLE CREEK	22	TREE	PICGLA	0.5	BATTLE CREEK	23	FORB	APOAND	0.5
BATTLE CREEK	22	TREE	PINPON	0.5	BATTLE CREEK	23	FORB	ARANUD	40
BATTLE CREEK	22	SHRUB	BETOC	0.5	BATTLE CREEK	23	FORB	CIRVUL	0.5
BATTLE CREEK	22	SHRUB	CORSTO	0.5	BATTLE CREEK	23	FORB	FRAVIR	0.5
BATTLE CREEK	22	SHRUB	PHYMON	0.5	BATTLE CREEK	23	FORB	GALBOR	0.5
BATTLE CREEK	22	SHRUB	ROSWO	0.5	BATTLE CREEK	23	FORB	GALTRI	0.5
BATTLE CREEK	22	SHRUB	RUBSPP	0.5	BATTLE CREEK	23	FORB	GERRIC	0.5
BATTLE CREEK	22	SHRUB	SALBEB	0.5	BATTLE CREEK	23	FORB	HALDEF	0.5
BATTLE CREEK	22	SHRUB	SALINT	30	BATTLE CREEK	23	FORB	LATOCH	0.5
BATTLE CREEK	22	SHRUB	TOXRYD	10	BATTLE CREEK	23	FORB	MAICAN	2.5
BATTLE CREEK	22	GRAM.	AGRCAN	0.5	BATTLE CREEK	23	FORB	PTEAQU	0.5
BATTLE CREEK	22	GRAM.	AGRSTO	10	BATTLE CREEK	23	FORB	RUDHIR	0.5
BATTLE CREEK	22	GRAM.	CARSCO	0.5	BATTLE CREEK	23	FORB	SANMAR	0.5
BATTLE CREEK	22	GRAM.	JUNSP	0.5	BATTLE CREEK	23	FORB	SIMISTE	0.5
BATTLE CREEK	22	GRAM.	MUHRAC	0.5	BATTLE CREEK	23	FORB	SOLSPP	0.5
BATTLE CREEK	22	GRAM.	PHAARU	0.5	BATTLE CREEK	23	FORB	THADAS	0.5
BATTLE CREEK	22	GRAM.	POAPAL	0.5	BATTLE CREEK	23	FORB	VICAME	0.5
BATTLE CREEK	22	GRAM.	POAPRA	2.5	BATTLE CREEK	23	FORB	VIOSPP	2.5
BATTLE CREEK	22	GRAM.	SCIMIC	2.5	BATTLE CREEK	24	TREE	BETPAP	20
BATTLE CREEK	22	FORB	ASTSPP	0.5	BATTLE CREEK	24	TREE	PICGLA	20
BATTLE CREEK	22	FORB	ATHFIL	0.5	BATTLE CREEK	24	TREE	PINPON	0.5
BATTLE CREEK	22	FORB	CAMROT	0.5	BATTLE CREEK	24	TREE	POPTRE	2.5
BATTLE CREEK	22	FORB	CICDIO	2.5	BATTLE CREEK	24	SHRUB	AMEALN	2.5
BATTLE CREEK	22	FORB	ELESPP	0.5	BATTLE CREEK	24	SHRUB	CORCOR	20
BATTLE CREEK	22	FORB	EQUARV	2.5	BATTLE CREEK	24	SHRUB	CORSTO	10
BATTLE CREEK	22	FORB	GLYSPP	2.5	BATTLE CREEK	24	SHRUB	LINBOR	40
BATTLE CREEK	22	FORB	LYSCIL	0.5	BATTLE CREEK	24	SHRUB	LONDIO	0.5
BATTLE CREEK	22	FORB	RUDHIR	0.5	BATTLE CREEK	24	SHRUB	PRUVIR	2.5
BATTLE CREEK	22	FORB	RUMEX	0.5	BATTLE CREEK	24	SHRUB	RIBSPP	0.5
BATTLE CREEK	22	FORB	SANMAR	0.5	BATTLE CREEK	24	SHRUB	ROSWO	10
BATTLE CREEK	22	FORB	SOLCAN	2.5	BATTLE CREEK	24	SHRUB	SPIBET	10
BATTLE CREEK	22	FORB	STAPAL	0.5	BATTLE CREEK	24	SHRUB	SYMOC	2.5
BATTLE CREEK	22	FORB	TAROFF	0.5	BATTLE CREEK	24	SHRUB	TOXRYD	0.5
BATTLE CREEK	22	FORB	TRIREP	0.5	BATTLE CREEK	24	GRAM.	AGRCAN	0.5
BATTLE CREEK	22	FORB	URDDIO	0.5	BATTLE CREEK	24	GRAM.	AGRSTO	0.5
BATTLE CREEK	23	TREE	BETPAP	40	BATTLE CREEK	24	GRAM.	BROCIL	0.5
BATTLE CREEK	23	TREE	PICGLA	10	BATTLE CREEK	24	GRAM.	ORYASP	0.5
BATTLE CREEK	23	TREE	PINPON	2.5	BATTLE CREEK	24	GRAM.	SCHPUR	0.5
BATTLE CREEK	23	TREE	POPTRE	0.5	BATTLE CREEK	24	FORB	ACHMIL	0.5
BATTLE CREEK	23	TREE	QUEMAC	10	BATTLE CREEK	24	FORB	APOAND	0.5
BATTLE CREEK	23	SHRUB	AMEALN	2.5	BATTLE CREEK	24	FORB	ARANUD	2.5
BATTLE CREEK	23	SHRUB	CORCOR	70	BATTLE CREEK	24	FORB	FRAVIR	0.5
BATTLE CREEK	23	SHRUB	LONDIO	0.5	BATTLE CREEK	24	FORB	GALBOR	0.5
BATTLE CREEK	23	SHRUB	PRUVIR	2.5	BATTLE CREEK	24	FORB	GALTRI	0.5
BATTLE CREEK	23	SHRUB	ROSWO	0.5	BATTLE CREEK	24	FORB	LATOCH	0.5
BATTLE CREEK	23	SHRUB	RUBSPP	0.5	BATTLE CREEK	24	FORB	MAICAN	2.5
BATTLE CREEK	23	SHRUB	SYMALB	2.5	BATTLE CREEK	24	FORB	OSMLON	0.5
BATTLE CREEK	23	SHRUB	SYMOC	0.5	BATTLE CREEK	24	FORB	SIMISTE	0.5
BATTLE CREEK	23	SHRUB	TOXRYD	20	BATTLE CREEK	24	FORB	STRAMP	0.5
BATTLE CREEK	23	GRAM.	BROCIL	0.5	BATTLE CREEK	24	FORB	THASPP	0.5
BATTLE CREEK	23	GRAM.	BROINE	0.5	BATTLE CREEK	25	SHRUB	CORSTO	2.5
BATTLE CREEK	23	GRAM.	CARSPP	30	BATTLE CREEK	25	SHRUB	PRUPEN	2.5
BATTLE CREEK	23	GRAM.	EQUAV	0.5	BATTLE CREEK	25	SHRUB	SALBEB	2.5
BATTLE CREEK	23	GRAM.	ORYASP	2.5	BATTLE CREEK	25	SHRUB	SAMRAC	0.5
BATTLE CREEK	23	GRAM.	POAPRA	2.5	BATTLE CREEK	25	GRAM.	AGRCAN	0.5
BATTLE CREEK	23	GRAM.	SCHPUR	0.5	BATTLE CREEK	25	GRAM.	AGRSPP	2.5
BATTLE CREEK	23	FORB	ACHMIL	0.5	BATTLE CREEK	25	GRAM.	BROCIL	0.5

DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER	DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER
BATTLE CREEK	25	GRAM.	CALCAN	2.5	BATTLE CREEK	26	FORB	CICMAC	0.5
BATTLE CREEK	25	GRAM.	CARCAN	0.5	BATTLE CREEK	26	FORB	EQUARV	0.5
BATTLE CREEK	25	GRAM.	MUHRAC	2.5	BATTLE CREEK	26	FORB	GALBOR	0.5
BATTLE CREEK	25	GRAM.	PHLPRA	0.5	BATTLE CREEK	26	FORB	GALTRI	0.5
BATTLE CREEK	25	GRAM.	POAPAL	2.5	BATTLE CREEK	26	FORB	GERRIC	0.5
BATTLE CREEK	25	GRAM.	POAPRA	0.5	BATTLE CREEK	26	FORB	HERSPH	0.5
BATTLE CREEK	25	FORB	ACHMIL	0.5	BATTLE CREEK	26	FORB	MAICAN	0.5
BATTLE CREEK	25	FORB	ANAMAR	0.5	BATTLE CREEK	26	FORB	PYRSPP	0.5
BATTLE CREEK	25	FORB	ASTSPP	0.5	BATTLE CREEK	26	FORB	RUDHIR	0.5
BATTLE CREEK	25	FORB	CAMROT	0.5	BATTLE CREEK	26	FORB	SMISTE	2.5
BATTLE CREEK	25	FORB	CICDOU	0.5	BATTLE CREEK	26	FORB	SOLSPP	0.5
BATTLE CREEK	25	FORB	CIRVUL	0.5	BATTLE CREEK	26	FORB	TAROFF	0.5
BATTLE CREEK	25	FORB	FRAVIR	0.5	BATTLE CREEK	26	FORB	THADAS	0.5
BATTLE CREEK	25	FORB	GERSPP	0.5	BATTLE CREEK	26	FORB	TRIPRA	0.5
BATTLE CREEK	25	FORB	GEUALE	0.5	BATTLE CREEK	26	FORB	TRIREP	2.5
BATTLE CREEK	25	FORB	HERSPH	2.5	BATTLE CREEK	26	FORB	VICAME	0.5
BATTLE CREEK	25	FORB	LATOCH	0.5	BATTLE CREEK	27	TREE	PINPON	0.5
BATTLE CREEK	25	FORB	MONFIS	0.5	BATTLE CREEK	27	TREE	POPDEL	20
BATTLE CREEK	25	FORB	PLASPP	0.5	BATTLE CREEK	27	TREE	SALINT	2.5
BATTLE CREEK	25	FORB	RUDHIR	0.5	BATTLE CREEK	27	TREE	SALLUT	0.5
BATTLE CREEK	25	FORB	SMISTE	0.5	BATTLE CREEK	27	SHRUB	BETOCC	2.5
BATTLE CREEK	25	FORB	SOLCAN	0.5	BATTLE CREEK	27	SHRUB	CORSTO	2.5
BATTLE CREEK	25	FORB	SOLSPP	0.5	BATTLE CREEK	27	SHRUB	PHYMON	0.5
BATTLE CREEK	25	FORB	TAROFF	0.5	BATTLE CREEK	27	SHRUB	ROSWOO	0.5
BATTLE CREEK	25	FORB	TRIHVB	0.5	BATTLE CREEK	27	SHRUB	SALBEB	40
BATTLE CREEK	25	FORB	VERTHA	0.5	BATTLE CREEK	27	SHRUB	SALPLA	0.5
BATTLE CREEK	25	FORB	VICAME	0.5	BATTLE CREEK	27	GRAM.	AGRSTO	10
BATTLE CREEK	25	FORB	VIOSPP	0.5	BATTLE CREEK	27	GRAM.	AGRTRA	0.5
BATTLE CREEK	26	TREE	BETPAP	40	BATTLE CREEK	27	GRAM.	BROINE	2.5
BATTLE CREEK	26	TREE	PICGLA	40	BATTLE CREEK	27	GRAM.	CARTEN	0.5
BATTLE CREEK	26	TREE	PINPON	0.5	BATTLE CREEK	27	GRAM.	DANSPI	0.5
BATTLE CREEK	26	TREE	POPTRE	2.5	BATTLE CREEK	27	GRAM.	MUHRAC	10
BATTLE CREEK	26	TREE	QUEMAC	0.5	BATTLE CREEK	27	GRAM.	PHLPRA	0.5
BATTLE CREEK	26	SHRUB	AMEALN	0.5	BATTLE CREEK	27	GRAM.	POAPAL	0.5
BATTLE CREEK	26	SHRUB	BETOCC	0.5	BATTLE CREEK	27	GRAM.	SCIATR	0.5
BATTLE CREEK	26	SHRUB	CORCOR	20	BATTLE CREEK	27	FORB	ACHMIL	0.5
BATTLE CREEK	26	SHRUB	CORSTO	10	BATTLE CREEK	27	FORB	AGAFOE	0.5
BATTLE CREEK	26	SHRUB	FRAVES	0.5	BATTLE CREEK	27	FORB	AMPBRA	0.5
BATTLE CREEK	26	SHRUB	PHYMON	2.5	BATTLE CREEK	27	FORB	AQUBRE	0.5
BATTLE CREEK	26	SHRUB	PRUVIR	0.5	BATTLE CREEK	27	FORB	ASTSPP	0.5
BATTLE CREEK	26	SHRUB	RIBSPP	0.5	BATTLE CREEK	27	FORB	ASTSPP	0.5
BATTLE CREEK	26	SHRUB	ROSWOO	2.5	BATTLE CREEK	27	FORB	CICDIO	0.5
BATTLE CREEK	26	SHRUB	SALBEB	20	BATTLE CREEK	27	FORB	EQUARV	0.5
BATTLE CREEK	26	SHRUB	SYMOC	2.5	BATTLE CREEK	27	FORB	EQUHYE	0.5
BATTLE CREEK	26	SHRUB	TOXRYD	0.5	BATTLE CREEK	27	FORB	EQUAE	0.5
BATTLE CREEK	26	GRAM.	AGRSTO	0.5	BATTLE CREEK	27	FORB	EUPMAC	0.5
BATTLE CREEK	26	GRAM.	BROCIL	2.5	BATTLE CREEK	27	FORB	FRAVES	0.5
BATTLE CREEK	26	GRAM.	CALCAN	2.5	BATTLE CREEK	27	FORB	GALBOR	0.5
BATTLE CREEK	26	GRAM.	CARMIC	0.5	BATTLE CREEK	27	FORB	GERRIC	0.5
BATTLE CREEK	26	GRAM.	CARRET	0.5	BATTLE CREEK	27	FORB	GEUALE	0.5
BATTLE CREEK	26	GRAM.	POAPAL	2.5	BATTLE CREEK	27	FORB	LYCAME	0.5
BATTLE CREEK	26	GRAM.	POAPRA	2.5	BATTLE CREEK	27	FORB	LYSCIL	0.5
BATTLE CREEK	26	GRAM.	PTEAND	0.5	BATTLE CREEK	27	FORB	MENARV	0.5
BATTLE CREEK	26	GRAM.	SCIMIC	0.5	BATTLE CREEK	27	FORB	OXASTR	0.5
BATTLE CREEK	26	FORB	ACHMIL	0.5	BATTLE CREEK	27	FORB	PARQUI	0.5
BATTLE CREEK	26	FORB	ANEVER	0.5	BATTLE CREEK	27	FORB	RUDHIR	0.5
BATTLE CREEK	26	FORB	ARANUD	10	BATTLE CREEK	27	FORB	RUMCRI	0.5

DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER	DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER
BATTLE CREEK	27	FORB	SOLGIG	0.5	BATTLE CREEK	29	SHRUB	SYMALB	2.5
BATTLE CREEK	27	FORB	SOLGRA	0.5	BATTLE CREEK	29	SHRUB	TOXRYD	0.5
BATTLE CREEK	27	FORB	SOLRID	0.5	BATTLE CREEK	29	GRAM.	BROMAR	0.5
BATTLE CREEK	27	FORB	STAPAL	0.5	BATTLE CREEK	29	GRAM.	CARSPP	0.5
BATTLE CREEK	27	FORB	TAROFF	0.5	BATTLE CREEK	29	GRAM.	CARSPP	0.5
BATTLE CREEK	27	FORB	THADAS	0.5	BATTLE CREEK	29	GRAM.	CARSPP	2.5
BATTLE CREEK	27	FORB	TRADUB	0.5	BATTLE CREEK	29	GRAM.	CARSPP	0.5
BATTLE CREEK	27	FORB	TRIHYP	2.5	BATTLE CREEK	29	GRAM.	MUHCUS	0.5
BATTLE CREEK	27	FORB	TRIREP	0.5	BATTLE CREEK	29	GRAM.	MUHRAC	2.5
BATTLE CREEK	27	FORB	VERTHA	0.5	BATTLE CREEK	29	GRAM.	ORYASP	2.5
BATTLE CREEK	27	FORB	VICAME	0.5	BATTLE CREEK	29	GRAM.	POAPRA	0.5
BATTLE CREEK	27	FORB	VIOSPP	0.5	BATTLE CREEK	29	FORB	ACHMIL	0.5
BATTLE CREEK	28	TREE	BETPAP	2.5	BATTLE CREEK	29	FORB	ACTRUB	0.5
BATTLE CREEK	28	TREE	PICGLA	70	BATTLE CREEK	29	FORB	ANTSPP	0.5
BATTLE CREEK	28	SHRUB	AMEALN	0.5	BATTLE CREEK	29	FORB	ARANUD	10
BATTLE CREEK	28	SHRUB	CORCOR	0.5	BATTLE CREEK	29	FORB	ASTSPP	0.5
BATTLE CREEK	28	SHRUB	LINBOR	0.5	BATTLE CREEK	29	FORB	ASTSPP	0.5
BATTLE CREEK	28	SHRUB	LONDIO	0.5	BATTLE CREEK	29	FORB	CAMROT	0.5
BATTLE CREEK	28	SHRUB	RIBSPP	0.5	BATTLE CREEK	29	FORB	CIRSPP	0.5
BATTLE CREEK	28	SHRUB	ROSWO	2.5	BATTLE CREEK	29	FORB	DISTRA	0.5
BATTLE CREEK	28	SHRUB	RUDHIR	0.5	BATTLE CREEK	29	FORB	EQUARV	0.5
BATTLE CREEK	28	SHRUB	SYMOCC	2.5	BATTLE CREEK	29	FORB	EQUHYE	0.5
BATTLE CREEK	28	GRAM.	CARSPP	0.5	BATTLE CREEK	29	FORB	GALBOR	0.5
BATTLE CREEK	28	GRAM.	DANSPI	0.5	BATTLE CREEK	29	FORB	GALTRI	0.5
BATTLE CREEK	28	GRAM.	ORYASP	0.5	BATTLE CREEK	29	FORB	GERRIC	0.5
BATTLE CREEK	28	GRAM.	SCHPUR	0.5	BATTLE CREEK	29	FORB	HERSPH	0.5
BATTLE CREEK	28	FORB	ACHMIL	0.5	BATTLE CREEK	29	FORB	LATOCH	0.5
BATTLE CREEK	28	FORB	ANTSPP	0.5	BATTLE CREEK	29	FORB	MAICAN	0.5
BATTLE CREEK	28	FORB	APOAND	0.5	BATTLE CREEK	29	FORB	OXASTR	0.5
BATTLE CREEK	28	FORB	ARANUD	10	BATTLE CREEK	29	FORB	PHYMON	0.5
BATTLE CREEK	28	FORB	CIRVUL	0.5	BATTLE CREEK	29	FORB	PTEAND	0.5
BATTLE CREEK	28	FORB	EQUARV	0.5	BATTLE CREEK	29	FORB	PYRSPP	0.5
BATTLE CREEK	28	FORB	FRAVES	0.5	BATTLE CREEK	29	FORB	RANSPP	0.5
BATTLE CREEK	28	FORB	GALBOR	0.5	BATTLE CREEK	29	FORB	RUDHIR	0.5
BATTLE CREEK	28	FORB	GALTRI	0.5	BATTLE CREEK	29	FORB	SMISTE	0.5
BATTLE CREEK	28	FORB	GERRIC	0.5	BATTLE CREEK	29	FORB	SOLRID	0.5
BATTLE CREEK	28	FORB	GOOREP	0.5	BATTLE CREEK	29	FORB	SONSPP	0.5
BATTLE CREEK	28	FORB	HALDEF	0.5	BATTLE CREEK	29	FORB	TAROFF	0.5
BATTLE CREEK	28	FORB	LATOCH	0.5	BATTLE CREEK	29	FORB	THADAS	0.5
BATTLE CREEK	28	FORB	MAICAN	0.5	BATTLE CREEK	29	FORB	THASPP	0.5
BATTLE CREEK	28	FORB	SMISTE	0.5	BATTLE CREEK	29	FORB	TRIREP	0.5
BATTLE CREEK	28	FORB	THASPP	0.5	BATTLE CREEK	29	FORB	VICAME	0.5
BATTLE CREEK	28	FORB	VIOSPP	0.5	BATTLE CREEK	29	FORB	VIOCAN	0.5
BATTLE CREEK	29	TREE	BETPAP	10	BATTLE CREEK	30	TREE	BETPAP	0.5
BATTLE CREEK	29	TREE	PICGLA	40	BATTLE CREEK	30	TREE	PINPON	2.5
BATTLE CREEK	29	TREE	POPTRE	0.5	BATTLE CREEK	30	TREE	POPDEL	40
BATTLE CREEK	29	SHRUB	AMEALN	2.5	BATTLE CREEK	30	TREE	POPTRE	0.5
BATTLE CREEK	29	SHRUB	APOAND	0.5	BATTLE CREEK	30	TREE	QUEMAC	0.5
BATTLE CREEK	29	SHRUB	CORSTO	0.5	BATTLE CREEK	30	SHRUB	BETOCC	2.5
BATTLE CREEK	29	SHRUB	FRAVES	0.5	BATTLE CREEK	30	SHRUB	CORSTO	0.5
BATTLE CREEK	29	SHRUB	LINBOR	2.5	BATTLE CREEK	30	SHRUB	OSTVIR	0.5
BATTLE CREEK	29	SHRUB	LONDIO	2.5	BATTLE CREEK	30	SHRUB	PHYMON	2.5
BATTLE CREEK	29	SHRUB	PRUVIR	0.5	BATTLE CREEK	30	SHRUB	RUBIDE	10
BATTLE CREEK	29	SHRUB	RIBAME	0.5	BATTLE CREEK	30	SHRUB	SALEXI	2.5
BATTLE CREEK	29	SHRUB	ROSWO	0.5	BATTLE CREEK	30	SHRUB	SALINT	30
BATTLE CREEK	29	SHRUB	RUBPUB	0.5	BATTLE CREEK	30	SHRUB	SHECAN	2.5
BATTLE CREEK	29	SHRUB	SPIBET	0.5	BATTLE CREEK	30	SHRUB	SYMOCC	0.5

DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER	DRAINAGE	SITE	PLANT TYPE	SPECIES	PERCENT COVER
BATTLE CREEK	30	GRAM.	AGRREP	0.5	BATTLE CREEK	37	FORB	RUMCRI	0.5
BATTLE CREEK	30	GRAM.	CARSPP	2.5	BATTLE CREEK	37	FORB	SCUGAL	0.5
BATTLE CREEK	30	GRAM.	DESCAE	2.5	BATTLE CREEK	37	FORB	SMISTE	0.5
BATTLE CREEK	30	GRAM.	GLYGRA	0.5	BATTLE CREEK	38	SHRUB	SALBEB	0.5
BATTLE CREEK	30	GRAM.	MUHRAC	10	BATTLE CREEK	38	GRAM.	AGRSTO	2.5
BATTLE CREEK	30	GRAM.	PANVIR	0.5	BATTLE CREEK	38	GRAM.	CALCAN	0.5
BATTLE CREEK	30	GRAM.	POAPAL	10	BATTLE CREEK	38	GRAM.	CARLAN	2.5
BATTLE CREEK	30	GRAM.	POAPRA	10	BATTLE CREEK	38	GRAM.	CARSPP	30
BATTLE CREEK	30	GRAM.	UNRGRA	10	BATTLE CREEK	38	GRAM.	GLYGRA	60
BATTLE CREEK	30	FORB	ACHLAN	0.5	BATTLE CREEK	38	GRAM.	SCIATR	2.5
BATTLE CREEK	30	FORB	AGAFOE	0.5	BATTLE CREEK	38	GRAM.	SCIMIC	0.5
BATTLE CREEK	30	FORB	AGRSTR	0.5	BATTLE CREEK	38	FORB	ALITRI	0.5
BATTLE CREEK	30	FORB	AMPBRA	0.5	BATTLE CREEK	38	FORB	LEMMIN	0.5
BATTLE CREEK	30	FORB	ANEMUL	0.5	BATTLE CREEK	38	FORB	LYCAME	0.5
BATTLE CREEK	30	FORB	ASTHES	0.5	BATTLE CREEK	38	FORB	POTGRA	0.5
BATTLE CREEK	30	FORB	ASTLAE	0.5	BATTLE CREEK	38	FORB	RUMCRI	0.5
BATTLE CREEK	30	FORB	CICDIO	2.5	BATTLE CREEK	38	FORB	SPAMUL	0.5
BATTLE CREEK	30	FORB	EPIANG	2.5					
BATTLE CREEK	30	FORB	EQU LAV	0.5					
BATTLE CREEK	30	FORB	EUPMAC	0.5					
BATTLE CREEK	30	FORB	GALTRI	0.5					
BATTLE CREEK	30	FORB	HERSPA	2.5					
BATTLE CREEK	30	FORB	LACBIE	0.5					
BATTLE CREEK	30	FORB	MELALB	2.5					
BATTLE CREEK	30	FORB	MELOFF	2.5					
BATTLE CREEK	30	FORB	MENARV	0.5					
BATTLE CREEK	30	FORB	MONFIS	0.5					
BATTLE CREEK	30	FORB	POTNOR	0.5					
BATTLE CREEK	30	FORB	RANPEN	0.5					
BATTLE CREEK	30	FORB	RUDHIR	0.5					
BATTLE CREEK	30	FORB	RUDLAC	10					
BATTLE CREEK	30	FORB	RUMCRI	0.5					
BATTLE CREEK	30	FORB	SOLGIG	2.5					
BATTLE CREEK	30	FORB	SONASP	0.5					
BATTLE CREEK	30	FORB	TRIPRA	0.5					
BATTLE CREEK	30	FORB	TRI REP	0.5					
BATTLE CREEK	30	FORB	URTDIO	2.5					
BATTLE CREEK	30	FORB	VICAME	0.5					
BATTLE CREEK	37	TREE	POPTRE	0.5					
BATTLE CREEK	37	SHRUB	SALBEB	0.5					
BATTLE CREEK	37	GRAM.	AGRSTO	2.5					
BATTLE CREEK	37	GRAM.	BROCIL	0.5					
BATTLE CREEK	37	GRAM.	CALCAN	20					
BATTLE CREEK	37	GRAM.	CARLAN	2.5					
BATTLE CREEK	37	GRAM.	CARSCO	2.5					
BATTLE CREEK	37	GRAM.	CARSPP	50					
BATTLE CREEK	37	GRAM.	IRIMIS	0.5					
BATTLE CREEK	37	GRAM.	PHLPRA	0.5					
BATTLE CREEK	37	GRAM.	POAPRA	2.5					
BATTLE CREEK	37	GRAM.	POTNOR	0.5					
BATTLE CREEK	37	GRAM.	SCIATR	2.5					
BATTLE CREEK	37	FORB	ACHMIL	0.5					
BATTLE CREEK	37	FORB	CICDIO	0.5					
BATTLE CREEK	37	FORB	CIRVUL	0.5					
BATTLE CREEK	37	FORB	LYCAME	0.5					
BATTLE CREEK	37	FORB	OXASTR	0.5					
BATTLE CREEK	37	FORB	RUDHIR	0.5					