

Appendix C.

1998 Colorado butterfly plant
Demographic Monitoring Plot Data

All plots are marked by orange-tipped rebar at the origin and endpoint. Plot size and location indicated below and shown on maps in Appendix A.

Key: S = small rosette, M = medium rosette, L = large rosette, Fl = Flowering or fruiting, D = dead.

Crow Creek # C1

Location: N 41° 09.250; W104° 52.516

Bank of Crow Creek on "island" just west of mown pavilion area and FamCamp picnic area.

Origin: 316° north from origin.

4 m x 6 m plot. Community of *Elymus virginicus* and *Agrostis stolonifera* in opening in *Populus deltoides*/*Salix exigua* shrubland. Vegetative cover ca 75-80% and ca 40 cm tall.

Date: 3 September 1998

Year	# Flowering/ fruiting plants	# Small Rosettes [largest leaf < 6 cm]	# Medium Rosettes [largest lf 6-18 cm]	# Large Rosettes [largest lf > 18 cm]
1997	3	47	141	6
1998	15	17	56	11

Demographic Data

Plant ID #	1998 Size Class	1997 Size Class	Longest basal leaf (cm)	Notes
1	D	M		Absent
2	D	M		Absent
3	D	M		Absent
4	?	M		Tag displaced
5	?	L		Tag displaced
6	?	M		Tag displaced
7	?	L		Tag displaced
8	?	M		Tag displaced
9	?	M		Tag displaced
10	D	M		Absent
11	D	M		Absent
12	D	M		Absent

13	L	M	19.0	
14	L	M	20.5	
15	D	M		Absent
16	M	M	17.2	
17	D	M		Absent
18	D?	S		
19	M	M	11.2	
20	M	M	13.9	
21	D	M		Absent
22	?	S		Tag displaced
23	S	S		Absent
24	D	M		Absent
25	D	M		Absent

Comments: This site experienced heavy mortality between 1997 and 1998, possibly due to high recreational use because of its proximity to the picnic area and creek. Of the 5 plants relocated, 2 made the transition from medium to large rosette. Flowering and fruiting increased from 3 plants in 1997 to 15 in 1998, but seedling and small rosette establishment dropped sharply.

Crow Creek # C2

Location: N 41° 09.492; W104° 52.501

Northeast side of Crow Creek in open meadow ca 200 feet north of creek just east of the large bend in the creek and opposite the last large cutbanks of the railroad track.

Origin: 290° west from origin.

3 m x 12 m plot . Open moist meadow with willows ca 3-5 feet tall and dense growth of leafy spurge and yarrow. Plot is being invaded by willow saplings.

Date: 3 September 1998

Year	# Flowering/ fruiting plants	# Small Rosettes [largest leaf < 6 cm]	# Medium Rosettes [largest lf 6-18 cm]	# Large Rosettes [largest lf > 18 cm]
1997*	x	x	x	X
1998	20	4	29	2

* Not surveyed in 1997

Crow Creek # C3

Location: N 41° 09.250; W104° 52.516

West side of FamCamp Road south of the Pavilion between the bend in the road and the last ash trees. Origin: 175° south from origin.

4 m x 10 m plot . Grassy meadow at edge of clump of willows and grove of ash trees. Canada thistles are locally abundant. Plot is being invaded by willow saplings.

Date: 3 September 1998

Year	# Flowering/ fruiting plants	# Small Rosettes [largest leaf < 6 cm]	# Medium Rosettes [largest lf 6-18 cm]	# Large Rosettes [largest lf > 18 cm]
1997	3	5	16	4
1998	3	10	20	5

Demographic Data

Plant ID #	1998 Size Class	1997 Size Class	Longest basal leaf (cm)	Notes
50	L	M	22.0	
51	D	M		Absent
52	Fl	L		Fl stem broken
53	Fl	L		
54	M	M	17.4	
55	D	M		Absent
56	L	M	18.0	
57	M	M	11.1	
58	M	M	12.0	
59	M	M	15.2	
60	D	M		Absent
61	M	M	10.1	
62	L	M	25.0	

Comments: All size classes in this plot were relatively stable between 1997-98. Three plants made the transition from medium to large, and 2 from large to reproductive. Mortality was 23% among the tagged plants.

Crow Creek # C4

Location: N 41° 09.244; W104° 52.357

North side of Nature Trail just south of picnic table and pond boardwalk. Origin: 138° southeast from origin.

3 m x 6 m plot . Level, gravelly terrace near nature trail and ditch. Open meadow dominated by *Agropyron cristatum*, *Agrostis stolonifera*, and *Poa pratensis* with dense stands of *Euphorbia esula*.

Date: 3 September 1998

Year	# Flowering/ fruiting plants	# Small Rosettes [largest leaf < 6 cm]	# Medium Rosettes [largest lf 6-18 cm]	# Large Rosettes [largest lf > 18 cm]
1997	10	36	89	4
1998	5	2	40	3

Demographic Data

Plant ID #	1998 Size Class	1997 Size Class	Longest basal leaf (cm)	Notes
26	D	M		
27	D	M		Absent
28	M	S	9.1	
29	?	M		Tag gone
30	?	M		Tag gone
31	D	M		
32	M	M	13.9	
33	M	S	12.3	
34	?	M		Tag gone
35	D	M		Absent
36	M	M	9.5	
37	S	S	5.3	
38	D	Fl		Absent
39	L	M	20.5	
40	M	M	14.0	
41	D	M		
42	Fl	M		
43	D	M		Absent
44	M	M	13.2	
45	Fl	M		
46	M	M	12.0	
47	?	S		Tag gone
48	M	M	11.5	
49	M	M	9.2	

Comments: This plot overlaps with a plot established by Linda Munk in 1998. 29% of all tagged plants from 1997 appeared to die in 1998 (only one of which was due to flowering). Two plants

made the transition from medium rosette to flowering.

Diamond Creek # D-1

Location: N41° 08.792; W104° 52.797

North side of second bend downstream from Base boundary (across from curve in 2-track road as it heads uphill below the observer post). Origin 29° N for 12 meters.

1 x 12 m plot. Community of *Agrostis stolonifera*, *Juncus balticus*, and *Cirsium arvense* on floodplain.

Date: 4 September 1998

Year	# Flowering/ fruiting plants	# Small Rosettes [largest leaf < 6 cm]	# Medium Rosettes [largest lf 6-18 cm]	# Large Rosettes [largest lf > 18 cm]
1997*	x	x	x	x
1998	5	5	40	4

* Not surveyed in 1997.

Diamond Creek # D-2

Location: N41° 08.668; W104° 52.917

North side of first bend downstream from Base boundary (ca 150 feet from metal "box" on far bank near large *Typha* patch). Origin 360° N for 7 meters.

4 x 7 m plot. Community of *Agrostis stolonifera*, *Juncus balticus*, and *Cirsium arvense* on floodplain.

Date: 4 September 1998

Year	# Flowering/ fruiting plants	# Small Rosettes [largest leaf < 6 cm]	# Medium Rosettes [largest lf 6-18 cm]	# Large Rosettes [largest lf > 18 cm]
1997*	x	x	x	x
1998	26	71	139	25

* Not surveyed in 1997.

Diamond Creek # D-3

Location: N41° 08.849; W104° 52.421

North side of large bend north of office complex on north side of Frontier Avenue (fourth bend downstream of Base boundary. Origin 282° W for 8 meters.

2 x 8 m plot. Meadow dominated by *Cirsium arvense*.

Date: 4 September 1998

Year	# Flowering/ fruiting plants	# Small Rosettes [largest leaf < 6 cm]	# Medium Rosettes [largest lf 6-18 cm]	# Large Rosettes [largest lf > 18 cm]
1997*	x	x	x	x
1998	10	11	40	1

* Not surveyed in 1997.

Unnamed Drainage # U1

Location: N 41° 08.176; W104° 52.258

On south bank of Unnamed Drainage and east of Cheyenne Road. Origin: 78° E for 15 meters.

4 m x 3 m plot. Community of *Agrostis stolonifera* and *Juncus balticus* with 95-100% vegetative cover. Average cover 24 cm tall.

Date: 4 September 1998

Year	# Flowering/ fruiting plants	# Small Rosettes [largest leaf < 6 cm]	# Medium Rosettes [largest lf 6-18 cm]	# Large Rosettes [largest lf > 18 cm]
1997	4	167	219	21
1998	54	48	136	50

Demographic Data

Plant ID #	1998 Size Class	1997 Size Class	Longest basal leaf (cm)	Notes
64	M	M	14.8	
65	M	S	13.2	
66	Fl	M		
67	M	S	13.0	
68	Fl	M		
69	L	M	25.0	
70	M	S	8.2	

71	M	M	14.9
72	M	M	15.9
73	?	M	
74	Fl	L	
75	M	S	13.0
76	Fl	M	
77	M	S	8.9
78	M	M	14.6
79	M	M	14.5
80	M	M	15.6
81	L	M	19.8
82	M	M	13.0
83*	missing		
84	M	S	7.5
85	M	M	17.0
86	M	M	16.5
87	M	M	16.4
88	Fl	M	
89	M	S	13.2
90	L	M	21.6
91	Fl	M	
92	M	S	11.3
93	M	M	10.8
94	M	S	9.1
95	L	M	20.7
96	L	M	19.3
97	D	S	
98	M	S	7.8
99	M	M	17.6
100	D	Fl	
101	M	M	17.6
102	M	S	13.2
103	D	M	
104	Fl	L	
105	M	M	15.4
106	Fl	M	
107	Fl	M	
108	Fl	L	
109	M	S	10.3
110	M	M	17.2
111	D	M	
112	D	Fl	

Tag gone

113	S	S	5.4	
114	M	S	18.0	
115	L	S	18.6	
116	Fl	M		
117	Fl	M		
118	D	S		
119	Fl	M		
120	?	M		Tag gone

Comments: 13 plants made the transition from rosettes to flowering, 11 of which started as medium rosettes in 1997. This finding contradicts previous hypotheses that rosettes need to pass through each size class before flowering. Plants in favorable habitats may experience extremely high growth rates and thus make the transition from medium rosette to reproductive in one growing season.

Unnamed Drainage # U3

Location: N 41° 08.191; W104° 52.294

North bank of Unnamed Drainage and east of Cheyenne Road (stake located by last big willow clump before cattails). Origin: 247° W from origin for 12 meters.

1 m x 12 m plot . Community of *Agrostis stolonifera* and *Juncus balticus*.

Date: 4 September 1998

Year	# Flowering/ fruiting plants	# Small Rosettes [largest leaf < 6 cm]	# Medium Rosettes [largest lf 6-18 cm]	# Large Rosettes [largest lf > 18 cm]
1997*	x	x	x	x
1998	57	64	137	38

* Not surveyed in 1997.

Unnamed Drainage # U3

Location: N 41° 08.191; W104° 52.294

North bank of Unnamed Drainage and east of Cheyenne Road (west of plot U-3). Origin: 66° N from origin for 12 meters.

1 m x 12 m plot . Community of *Agrostis stolonifera* and *Juncus balticus*.

Date: 4 September 1998

Year	# Flowering/ fruiting plants	# Small Rosettes [largest leaf < 6 cm]	# Medium Rosettes [largest lf 6-18 cm]	# Large Rosettes [largest lf > 18 cm]
1997*	x	x	x	x
1998	15	5	27	8

* Not surveyed in 1997.
