

# Voucher and Verify *Botrychium* Locations on the Colville National Forest Final Report for the 2012 ISSSSP Project

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Date: May 1, 2014

## SUMMARY

The objective of this two-year project was to validate the Region 6 *Botrychium* Conservation Assessment (2007), regarding the identifications of species and their abundances on the Colville National Forest. Revisits in 2012 and 2013 of unvouchered sites of formerly rare *Botrychium* taxa (*B. minganense*, *B. lunaria*, and *B. pinnatum*) originally documented between 1991 and 2001 resulted in the confirmation of identifications for 33 Element Occurrences (EOs) (Table 1). Identifications were also verified for seven EOs through found existing vouchers. In addition, the locations of another 27 EOs were revisited, although target species were not seen. Revisits documented one new location of *B. crenulatum*, which is on the Regional Forester’s Special Status Species List of Sensitive Vascular Plants (2011).

Table 1. Results of 2012 and 2013 Revisits.

<b>Revisit Result</b>	<b>Number of Sites (Element Occurrences)</b>
EOs relocated; target species found; identification confirmed.	33
Voucher specimens found for EO; identifications confirmed.	9
EOs relocated; target species not found; other <i>Botrychium</i> species identified.	7
EOs relocated; no <i>Botrychiums</i> found.	20
EOs not revisited.	19
<b>TOTAL</b>	<b>88</b>

## BACKGROUND

Six Sensitive species of *Botrychium* are documented from the Colville National Forest (USDA FS 2011). The federal, global and Washington State status for each is displayed on Table 2 (WNHP 2014).

Table 2. Sensitive *Botrychium* Taxa Documented from the Colville National Forest.

Species	Federal Status <sup>1</sup>	Global Rank <sup>2</sup>	WA Rank <sup>3</sup>	WA Status <sup>4</sup>
Upswept moonwort ( <i>Botrychium ascendens</i> )	SC	G2G3	S2	Sensitive
Crenulate moonwort ( <i>Botrychium crenulatum</i> )	SC	G3	S3	Sensitive
Western moonwort ( <i>Botrychium hesperium</i> )		G4	S1	Threatened
Skinny moonwort ( <i>Botrychium lineare</i> )		G2?	S1	Threatened
Two-spiked moonwort ( <i>Botrychium paradoxum</i> )	SC	G2	S2	Threatened
Stalked moonwort ( <i>Botrychium pedunculosum</i> )	SC	G2G3	S2	Sensitive

<sup>1</sup>SC = Species of Concern. An unofficial status, the species appears to be in jeopardy, but insufficient information to support listing.

<sup>2</sup>G2 = Imperiled globally (6 to 20 occurrences).

<sup>2</sup>G3 = Either very rare and local throughout its range or found locally in a restricted range (21 to 100 occurrences).

<sup>2</sup>G4 = Apparently secure globally.

<sup>3</sup>S1 = Critically imperiled (5 or fewer occurrences).

<sup>3</sup>S2 = Imperiled (6 to 20 occurrences), very vulnerable to extirpation.

<sup>3</sup>S3 = Rare or uncommon (21 to 100 occurrences).

<sup>4</sup>Sensitive = Vulnerable or declining and could become Endangered or Threatened in the state.

<sup>4</sup>Threatened = Likely to become Endangered in Washington.

It is well-known that *Botrychium* species occur in genus communities with mixed species assemblages (Ahrensleger and Potash 2007). Common species, *B. lunaria*, *B. minganense* and *B. pinnatum*, grow in the same habitats and locations as the Sensitive taxa. In addition, moonworts are easily misidentified. *Botrychium minganense* and *B. lunaria* are similar to *B. crenulatum*. *Botrychium pinnatum* can be mistaken for *B. pedunculosum* or *B. hesperium* (ISU 2014).

*Botrychium lunaria*, *B. minganense* and *B. pinnatum* were on the R6 Sensitive Plant List in the 1990's, when *Botrychium* identification skills of plant surveyors on the Forest were in their infancy. During that time the number of known *Botrychium* species documented on the Colville National Forest exploded from two, *B. minganense* and *B. montanum*, to 13 with the addition of *B. ascendens*, *B. crenulatum*, *B. hesperium*, *B. lineare*, *B. lunaria*, *B. paradoxum*, *B. pedunculosum*, *B. pinnatum*, and *B. simplex*. Since that time, we have increased our understanding of moonwort habitats, timing of emergence, and threats.

The Region 6 "Conservation Assessment for 13 Species of Moonworts (*Botrychium* Swartz Subgenus *Botrychium*)" states that one of the problems in managing *Botrychiums* is misidentification of plants (2007). Through ISSSP funding in FY2005 and FY2006, we focused

our work on confirming identifications by revisiting locations of Sensitive *Botrychium* species that weren't vouchered or hadn't been revisited in 10 years (Ahrensleger 2005, 2006). Dr. Donald Farrar of Iowa State University verified voucher identifications.

This work resulted in vouchers that confirmed the identifications of the target species for 21 EOs. At the locations for 40 EOs, the species found were other than the target. For 28 of those EOs, the identifications were changed to the taxa vouchered in 2005 or 2006. For 12 of them we recommended revisits to verify identifications. At 19 EOs no *Botrychiums* were seen. The 2005 and 2006 revisits also resulted in a new sighting each of *B. crenulatum* and *B. pedunculatum*.

The 2005 and 2006 projects did not include 88 locations of formerly Sensitive taxa, *Botrychium lunaria*, *B. minganense* and *B. pinnatum* that were originally documented in the 1990's and were not vouchered. We questioned the identifications of plants from this time period and wanted to make sure there were no misidentified Sensitive *Botrychium* taxa. The objectives of the 2012-2013 work were to collect vouchers and verify identifications from locations not included in the 2005 and 2006 projects.

## METHODS

The 88 unvouchered locations of the currently common moonwort species were grouped for revisits by geography to minimize driving time and maximize efficiency for 2012 and 2013 revisits (Maps 1 and 2). An estimate of how long it would take to revisit each group of sites was also established and is displayed in Appendix 2. Groups of sites were prioritized by the number of individual plants at each location. Since it's been such a long time since these sites were visited, we thought there would be a better chance of finding plants if we started with the largest populations. Collections were vouchered using standard herbarium techniques. Identifications followed those of Farrar (ISU 2014).

## RESULTS

Appendix 1 summarizes the site revisit results for 88 *Botrychium* EOs. Target taxa were found and identifications confirmed for 33 EOs. Existing vouchers were located and identifications confirmed for another nine EOs. We were delighted to find that the original identifications matched our current notion of the taxa.

At seven EOs, the target species were not found, but other moonwort taxa were. We don't think these were misidentifications, as *Botrychium montanum* is not usually mistaken for *B. minganense*. In addition, the target species *B. pinnatum*, it is not confused with *B. minganense* or *B. montanum* (Appendix 1). For 20 EOs no moonworts were found at the relocated sites. This was most interesting, as the habitats for most of the sites were similar to those of the original sightings. Nineteen of the locations were not revisited, as access was limited by roads closed since the initial site visit, which would have resulted in longer walk-ins and more time needed than estimated. Revisits documented one new location of *B. crenulatum*, which is on the Regional Forester's Special Status Species List of Sensitive Vascular Plants (2011).

Herbarium vouchers were collected from each revisited site, where plants were found. All survey information was entered into NRIS and resulted in 131 acres surveyed for the 28 sites revisited in 2012 and 279 acres surveyed for the 32 sites revisited in 2013. Sighting forms with

attached photocopies of vouchers were made for a permanent record for all sites revisited where Sensitive taxa were found.

#### REFERENCES:

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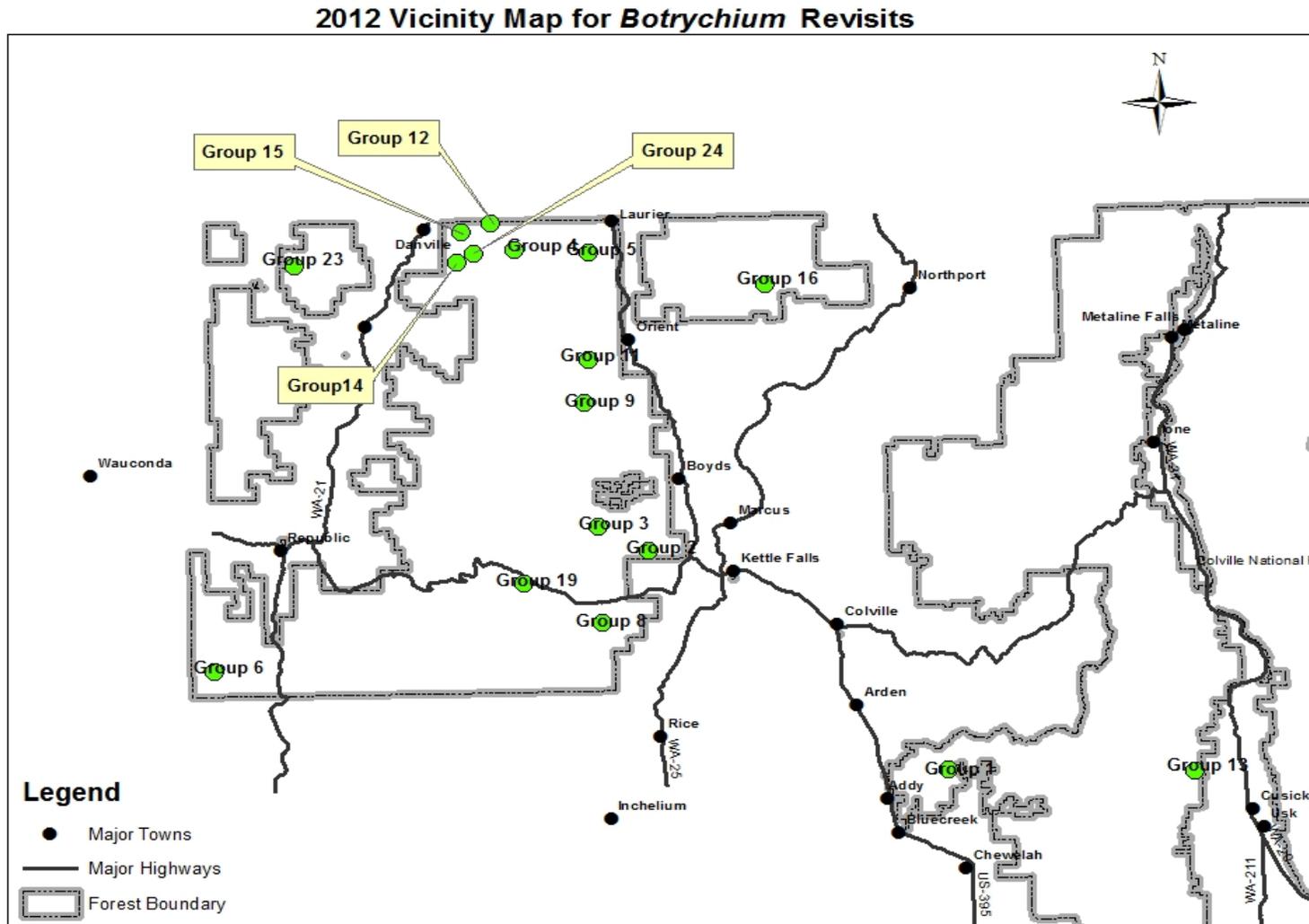
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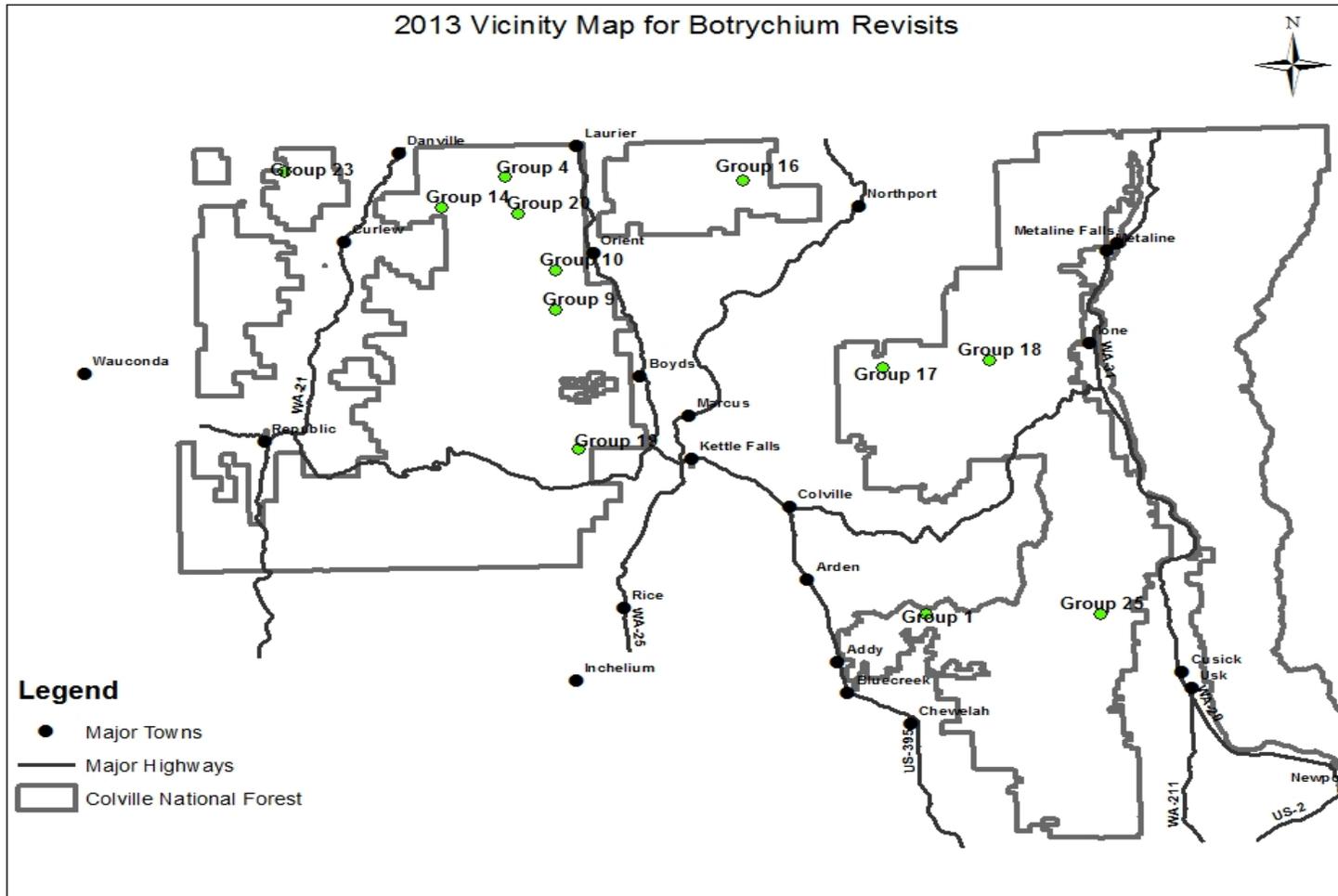
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Map 1.



Map 2.



Appendix 1. Revisit Results for 2012 and 2013.

Target Species, EO# or FO#	Site Name	Original Sighting Date (# of Plants)	Revisit Date (# of Plants)	Specimen or Photo
Sites relocated; target species found; identification confirmed.				
<b>B. minganense</b>				
EO#20	Flat Creek 215 Rd.	7/29/1991 ( 33)	9/12/2012 ( 10)	S
EO#25	S of Swan Butte	7/25/1996 (235)	7/26/2012 (270)	S
EO#29	Nancy Planning, Bisbee Meadow	6/27/1991 (440)	7/30/2012 ( 98)	S
EO#35	N Boulder Ridge	8/13/1991 (180)	9/13/13 (215)	S
EO#47	Trib. Middle Fork Boulder Creek	8/16/1991 ( 50)	7/30/2013 ( 19)	S
EO#77	Thomboy Planning	5/22/1992 (238)	8/22/2013 ( 43)	S
EO#80	NW Onion Creek 166/160 Rd.	8/26/1992 ( 15)	9/10/2013 (231)	S
EO#81	E Table Springs	8/21/1992 ( 5)	9/10/2013 ( 48)	S
EO#86	SW Trib. 460 Rd.	7/1/1996 ( 2)	9/12/2013 ( 1)	P
EO#88	Trib. to Trout Creek	7/8/1992 ( 88)	7/23/2012 (114)	S
EO#89	S15 Trib. 280 Rd.	7/9/1992 ( 14)	9/11/2013 ( 6)	S
EO#102	Lower S Fork Rogers Creek	9/14/1998 ( 1)	8/19/2013 ( 2)	S
EO#161	S Fork Tacoma Creek	7/12/1993 ( 32)	9/17/2013 ( 32)	S
EO#223	Donaldson Draw	5/17/1994 (346)	7/2/2012 (210)	S
FO#8	Fritz Creek 404/410 Rds.	8/7/1995 ( 4)	7/24/2012 ( 13)	S
FO#18	Upper Kerry Creek 215 Rd.	10/6/1997 ( 30)	8/21/2012 ( 4)	S
FO#20	Trib. American Fork Sheep Creek	8/21/1996 ( 37)	9/12/2013 ( 29)	S
FO#22	570 Rd. Seep	7/18/1996 ( 12)	8/1/2012 ( 1)	P
FO#23	Hoodoo Creek Upstream 366 Rd.	7/30/1996 (400)	8/1/2012 ( 3)	S
FO#38	Grouse-195 Rd. Stream	8/14/1997 (163)	8/21/2012 ( 1)	P
FO#41	Lone Ranch Trib.	7/23/1997 ( 39)	8/29/2013 (203)	S
FO#66	N Pond Seldom Seen Mountain	9/28/1998 ( 22)	8/7/2013 (105)	S
FO#67	S Trib. Meadow Creek S12	7/30/1998 ( 16)	8/8/2013 ( 21)	S
FO#68	Trib. Big Meadow Lake	7/16/1998 ( 44)	8/8/2013 (126)	S
FO#80	Lone Ranch Creek	8/2/1995 (150)	8/29/2013 (203)	S
FO#110	N Fork Day Creek	7/14/1997 ( 7)	8/6/2012 ( 36)	S
FO#D	Trib. to Flat Creek	8/8/1991 ( 55)	9/12/2012 ( 2)	S
FO#E	N Fork Catherine Creek	8/10/1992 ( 50)	9/3/2013 ( 1 )	
FO#F	E Fork LaFleur Creek	8/12/1992 ( 60)	8/2/2012 ( 66)	S
FO# 17029	Upper Leslie Creek	8/8/1995 (142)	9/4/2013 (108)	S
FO# 17028	Bayley Creek	9/11/1995 ( 14)	9/4/2013 ( 4)	P

Appendix 1. Revisit Results for 2012 and 2013, continued.				
Target Species, EO# or FO#	Site Name	Original Sighting Date (# of Plants)	Revisit Date (# of Plants)	Specimen or Photo
Sites relocated; target species found; identification confirmed.				
<b>B. lunaria</b>				
FO#20	Meadow Creek S2	7/9/1998 ( 4)	7/22/2013 ( 2)	P
<b>B. pinnatum</b>				
EO#69	E Fork Smalle Creek	7/12/1993 ( 37)	8/7/2012 ( 2)	S
Sites relocated; target species not found; other <i>Botrychium</i> species identified.				
<b>B. minganense</b>				
EO#163	Rose Ranch	6/2/1993 ( 6)	7/17/2013 <i>B. montanum</i>	S
EO#236	Smalle Creek	7/15/1992 (200)	8/7/2012 <i>B. montanum</i>	P
FO#B	Trib. to Leslie Creek	8/22/1995 ( 1)	7/25/2012 <i>B. montanum</i>	P
<b>B. pinnatum</b>				
EO#34	Bisbee Meadow	6/26/1991 ( 1)	7/30/2012 <i>B. montanum</i>	S
EO#50	Thomboy 120/090 Rds.	5/22/1992 ( 1)	8/22/2013 <i>B. minganense</i>	S
FO#11	Trib. Independent Creek 9576 Rd.	7/15/1997 ( 4)	8/29/2012 <i>B. minganense</i> <i>B. montanum</i>	S
FO#C	Swan Lake Trail	6/13/1993 ( 2)	7/26/2012 <i>B. montanum</i>	S
Sites relocated; no <i>Botrychiums</i> found.				
<b>B. lunaria</b>				
EO#26	Flat Creek	8/8/1991 ( 1)	9/12/2012	
FO#6	Midpoint Independent Creek	7/28/1997 (119)	8/29/2012	
<b>B. minganense</b>				
EO#48	Middle Fork Little Boulder Creek	8/21/1991 ( 46)	7/29/2013	
EO#70	S Fork Little Boulder	8/8/1995 ( 22)	7/29/2013	
EO#78	Roes TS #6	5/18/1992 ( 60)	7/30/2013	
EO#79	Trib. To Independent Creek	9/22/1992 ( 10)	9/9/2013	
EO#95	Mt. Rogers	8/20/1992 ( 13)	8/19/2013	
EO#106	Lonely S Side 688/9576 Rd.	7/14/1992 ( 1)	9/4/2012	
EO#233	Cy Creek Off Kolle Creek	7/29/1993 ( 3)	9/18/2013	
EO#237	Trimble Creek	7/12/1993 ( 18)	8/7/2012	

Appendix 1. Revisit Results for 2012 and 2013, continued.				
Target Species, EO# or FO#	Site Name	Original Sighting Date (# of Plants)	Revisit Date (# of Plants)	Specimen or Photo
Sites relocated; no <i>Botrychiums</i> found.				
<b>B. minganense</b>				
FO#10	Sherman 070/073 Rds. Marsh	8/16/1995 ( 17)	8/14/2013	
FO#12	Sherman B-Buttes 315/310	8/22/1995 ( 11)	7/18/2012	
FO#40	Trib. 370 Rd. Unit CD	7/17/1997 (279)	8/29/2012	
FO#56	Upper Trib. Independent	9/10/1998 ( 1)	9/9/2013	
FO#77	Tenas Mary Creek	7/13/1995 ( 50)	8/6/2012	
FO#101	S Fork Day Creek	7/3/1997 ( 24)	8/6/2012	
<b>B. montanum</b>				
EO#65	S Fork Little Boulder 252 Rd.	8/8/1995 ( 5)	7/29/2013	
<b>B. pinnatum</b>				
EO#91	Roger's Mountain Trail	6/22/1995 ( 1)	8/19/2013	
FO#6	McInnis Rd. Meadow	6/20/1995 ( 2)	8/8/2013	
FO#108	N Fork Lone Ranch Creek	7/28/1997 ( 3)	9/4/2012	
Sites not revisited.				
<b>B. minganense</b>				
EO#27	SW Trib. Nancy Creek	6/26/1991 ( 24)		
EO#28	SW Trib. Nancy Creek	6/26/1991 ( 24)		
EO#45	Upper Trib. Pack Creek	9/17/1991 ( ?)		
EO#77	Thomboy Planning	5/22/1992 (238)		
EO#150	Calispell Peak Creek Rd. 2341	8/23/1993 ( 1)		
EO#160	S Fork Tacoma Creek	7/13/1993 ( 11)		
EO#162	N Fork S. Fork Tacoma Creek	7/7/1993 ( 49)		
EO#184	Jenny Creek Trib./Swamp	10/17/1997( 5)		
FO#A	Leslie Creek	6/10/1996 ( 1)		
FO#19	SE Trib. Canyon Creek	10/5/1995 (125)		
FO#50	Togo Creek	8/5/1997 (220)		
FO#83	N Creek/Boundary Mountain	8/4/1995 (500)		
FO#G	N Fork Lone Ranch Creek	7/1/1991 ( 3)		

Appendix 1. Revisit Results for 2012 and 2013, continued.				
Target Species, EO# or FO#	Site Name	Original Sighting Date (# of Plants)	Revisit Date (# of Plants)	Specimen or Photo
Sites not revisited.				
<b>B. pinnatum</b>				
EO#50	Thomboy 120/090 Rds.	5/22/1992 ( 1)		
EO#51	W Trib. S Fork Boulder S5	7/17/1992 ( 1)		
EO#90	Upper 370 Rd. Trib. Independent Creek	9/16/1994 ( 1)		
EO#130	Upper Merkel Canyon	6/6/1996 ( 1)		
FO#4	Upper Trib. Canyon Creek S16	9/21/1995 ( 1)		
FO#17	Lower Clinton Creek	9/18/1998 ( 1)		
Voucher specimens found; identifications confirmed.				
<b>B. manganense</b>				
EO#14	S Side Leola Creek	8/5/1991 (150)		
EO#101	Kolle Creek	8/26/1992 ( 40)		
EO#110	N Fork of S Fork Tacoma Creek	6/30/1993 ( 50)		
EO#159	BJ	6/15/1993 ( 56)		
EO#235	Lodge Creek/Mosquito Point	7/23/1993 ( 16)		
FO#16	Deer End 275 Rd. E	9/5/1995 (275)		
FO#59	6120_450 Rd.	8/31/2001 ( 60)		
<b>B. pinnatum</b>				
EO#33	S Side Leola Creek	8/5/1991 ( 1)		
FO#03	Deer End 275 Rd. E	8/24/1995 ( 52)		

Appendix 2. Groups of Sites Revisited in 2012 and 2013 with Dates, Population Numbers and Comments. Abbreviations: BOLU=*B. lunaria*, BOMI=*B. minganense*, BOMO=*B. montanum* and BOPI=*B. pinnatum*.

Group # (# of days to Re-visit)	Species	EO #	FO# (#of Sub-populations)	Site Name	Sighting Date (# of Plants)	2012 and 2013 Survey Dates (# of Target Species)	Target Species Found <u>Yes/No</u> , <u>Specimen/Photo</u>	Comments, Other Species Names (# of Plants)
Groups of sites with over 100 plants at an individual site.								
1 (1)	BOMI		A	Leslie Creek	6/10/1996 (1)	7/25/2012	N	Site not relocated.
	BOMI		B	Trib. to Leslie Creek	8/22/1995 (1)	7/25/2012	N	<i>B. montanum</i> (60)
	BOMI		17029	Upper Leslie Creek	8/8/1995 (142)	9/4/2013 (108)	Y, S	<i>B. montanum</i> (3)
	BOMI		17028 (2)	Bayley Creek	9/11/1995 (14)	9/4/13 (4) P	Y	No apparent habitat changes.
2 (1)	BOMI	29	(2)	Nancy Planning, Bisbee Meadow	6/27/1991 (440)	7/30/2012 (98)	Y, S	<i>B. montanum</i> (4). Lots of blowdown present on site, less canopy cover.
	BOPI	34		Bisbee Meadow	6/26/1991 (1)	7/30/2012	N	
	BOMI	27		SW Trib. Nancy Creek	6/26/1991 (24)			Site not revisited, access is 1 mile up creek.
	BOMI	28		SW Trib. Nancy Creek	6/26/1991 (24)			Site not revisited, access is 0.5 mile up creek.
3 (1)	BOMI		22	570 Rd. Seep	7/18/1996 (12)	8/1/2012 (1)	Y, P	
	BOMI		23	Hoodoo Creek Upstream 366 Rd.	7/30/1996 (400)	8/1/2012 (3)	Y, S	
	BOPI	51		W Trib. S Fork Boulder S5	7/17/1992 (1)			Site not revisited, access is 1.25 mile up creek.
	BOPI	130		Upper Merkel Canyon	6/6/1996 (1)			Site not revisited, access is 0.5 mile up creek.

Appendix 2. Groups of Sites Revisited in 2012 and 2013 with Dates, Population Numbers and Comments, continued.								
Group # (# of days to Re-visit)	Species	EO #	FO# (#of Sub-populations)	Site Name	Sighting Date (# of Plants)	2012 and 2013 Survey Dates (# of Target Species)	Target Species Found <u>Yes/No</u> , <u>Specimen/Photo</u>	Comments, Other Species Names (# of Plants)
Groups of sites with over 100 plants at an individual site.								
4 (1)	BOMI		40	Trib. 370 Rd. Unit CD	7/17/1997 (279)	8/29/2012	N	Site relocated. Habitat changed, no water present in area, no signs of scouring/flooding in recent past.
	BOMI		56 (6)	Upper Trib. Independent	9/10/1998 (1)	9/9/2013	N	Surveyed area of site and beyond, shade component reduced, heavy brush.
	BOLU		6 (4)	Midpoint Independent Creek	7/28/1997 (119)	8/29/2012	N	Site relocated. Shade component reduced, heavy devil's club.
	BOPI	90	(2)	Upper 370 Rd. Trib. Independent Creek	9/16/1994 (1)			Site not revisited, access is 2 miles up creek.
	BOPI		11	Trib. Independent Creek 9576 Rd.	7/15/1997 (4)	8/29/2012	N	<i>B. manganense</i> (2), <i>B. montanum</i> (89). Shade component of riparian area reduced, heavy devil's club.
	BOMI	79		Trib. to Independent Creek	9/22/1992 (10)	9/9/2013	N	Surveyed area of site and beyond. Area burned in 2003 Togo Mountain Fire. Shade component eliminated, heavy brush.
	BOMI	80		NW Onion Creek 166/160 Rd.	8/26/1992 (15)	9/10/13 (231)	Y, S	<i>B. lanceolatum</i> (38), <i>B. crenulatum</i> (3). New <i>B. crenulatum</i> site.
	BOMI	81		E Table Springs	8/21/1992 (5)	9/10/2013 (48)	Y, S	Habitat in upper portion of site intact, lower portion shows recent heavy scouring.

Appendix 2. Groups of Sites Revisited in 2012 and 2013 with Dates, Population Numbers and Comments, continued.								
Group # (# of days to Re-visit)	Species	EO #	FO# (#of Sub-populations)	Site Name	Sighting Date (# of Plants)	2012 and 2013 Survey Dates (# of Target Species)	Target Species Found <u>Yes/No</u> , <u>Specimen/Photo</u>	Comments, Other Species Names (# of Plants)
Groups of sites with over 100 plants at an individual site.								
5 (1)	BOMI		18 (5)	Upper Kerry Creek 215 Rd.	10/6/1997 (30)	8/21/2012 (4)	Y, S	Lots of blowdown, less shade, evidence of recent scouring and flooding, stream cut 1.5-3 ft. below old streambed, stream course altered.
	BOMI	45		Upper Trib. Pack Creek	9/17/1991			Site not revisited, access is 3-mile up jeep trail.
	BOMI		38	Grouse-195 Rd. Stream	8/14/1997 (163)	8/21/2012 (1)	Y, P	<i>B. montanum</i> (7). Lots of blowdown, less shade, stream now intermittent, evidence of flooding this season.
	BOMI	184	(2)	Jenny Creek Trib./Swamp	10/17/1997 (25)	8/21/2012		Site not revisited, access is 0.5 mile up creek.
	BOLU		(2)	Jenny Creek Trib./Swamp				Site not revisited, access is 0.5 mile up creek.
6 (1)	BOMI	25	(3)	S of Swan Butte	7/25/1996 (235)	7/26/2012 (270)	Y, S	Some recreational use on east side of site, population in good shape.
	BOPI		C	Swan Lake Trail	6/13/1993 (2)	7/26/2012	N	<i>B. minganense</i> (354). Lots of blowdown, less shade; doesn't appear to have affected population much.
7 (1)	BOMI	14		S Side Leola Creek	8/5/1991 (150)			Voucher found and identification confirmed.
	BOPI	33		S Side Leola Creek	8/5/1991 (1)			Voucher found and identification confirmed.

Appendix 2. Groups of Sites Revisited in 2012 and 2013 with Dates, Population Numbers and Comments, continued.								
Group # (# of days to Re-visit)	Species	EO #	FO# (#of Sub-populations)	Site Name	Sighting Date (# of Plants)	2012 and 2013 Survey Dates (# of Target Species)	Target Species Found <u>Yes/No</u> , <u>Specimen/Photo</u>	Comments, Other Species Names (# of Plants)
Groups of sites with over 100 plants at an individual site.								
8 (0.5)	BOMI		19	SE Trib. Canyon Creek	10/5/1995 (125)			Site not revisited, access is 1.5 mile up closed road and 0.25 mile overland.
	BOPI		4	Upper Trib. Canyon Creek S16	9/21/1995 (1)			Site not revisited, 1 mile off-trail hike.
	BOMI	223	(2)	Donaldson Draw	5/17/1994 (346)	7/2/2012 (210)	Y, S	<i>B. montanum</i> (4), <i>B. lanceolatum</i> (1). No habitat changes noted.
9 (0.5)	BOMI	77	(3)	Thomboy Planning	5/22/1992 (238)	8/22/13 (43)	Y, S	No habitat changes noted.
	BOPI	50		Thomboy 120/090 Rds.	5/22/1992 (1)	8/22/2013	N	<i>B. minganense</i> (43). No habitat changes noted.
10 (0.5)	BOMI	35	(3)	N Boulder Ridge	8/13/1991 (180)	9/13/13 ( 215)	Y, S	<i>B. montanum</i> (64)
11 (0.5)	BOMI		16 (2)	Deer End 275 Rd. E	9/5/1995 (275)		Y	Voucher found and identification confirmed.
	BOPI		3	Deer End 275 Rd. E	8/24/1995 (52)		N	Site not revisited.
12 (0.5)	BOMI		50	Togo Creek	8/5/1997 (220)			Site not revisited, 1 mile road walk and 0.5 mile up creek.
13 (0.5)	BOMI	236		Smalle Creek	7/15/1992 (200)	8/7/2012	N	<i>B. montanum</i> (1)
	BOPI	69		E Fork Smalle Creek	7/12/1993 (37)	8/7/2012 (2)	Y, S	<i>B. montanum</i> (9)
	BOMI	237		Trimble Creek	7/12/1993 (18)	8/7/2012	N	Site relocated.

Appendix 2. Groups of Sites Revisited in 2012 and 2013 with Dates, Population Numbers and Comments, continued.								
Group # (# of days to Re-visit)	Species	EO #	FO# (#of Sub-populations)	Site Name	Sighting Date (# of Plants)	2012 and 2013 Survey Dates (# of Target Species)	Target Species Found <u>Yes/No</u> , <u>Specimen/Photo</u>	Comments, Other Species Names (# of Plants)
Groups of sites with over 100 plants at an individual site.								
14 (0.5)	BOMI		110 (2)	N Fork Day Creek	7/14/1997 (7)	8/6/2012 (36)	Y, S	Evidence of recent scouring, toe-slope areas drier than before, evidence of cows in area.
	BOMI		41 (3)	Lone Ranch Trib.	7/23/1997 (39)	8/29/13 (203)	Y, S	
	BOMI		101	S Fork Day Creek	7/3/1997 (24)	8/6/2012	N	Site relocated. Outside enclosure lots of trampling and cattle activity, habitat within enclosure good.
	BOMI	106		Lonely S Side 688/9576 Rd.	7/14/1992 (1)	9/4/2012	N	Site relocated. Evidence of recent scouting, quite a few trees uprooted along the bank, creek level low and below the bench.
	BOMI	41	80 (2)	Lone Ranch Creek /Lone Ranch Trib.	8/2/1995 (150)	8/29/13 (230)	Y, S	
15 (0.5)	BOMI		83	N Creek/Boundary Mountain	8/4/1995 (500)			Site not revisited, road closed, 4-mile walk-in.

Appendix 2. Groups of Sites Revisited in 2012 and 2013 with Dates, Population Numbers and Comments, continued.								
Group # (# of days to Re-visit)	Species	EO #	FO# (#of Sub-populations)	Site Name	Sighting Date (# of Plants)	2012 and 2013 Survey Dates (# of Target Species)	Target Species Found <u>Yes/No</u> , <u>Specimen/Photo</u>	Comments, Other Species Names (# of Plants)
Groups of sites with under 100 plants at an individual site.								
16 (2)	BOMI	86	(2)	SW Trib. 460 Rd.	7/1/1996 (2)	9/12/2013 (1)	Y, P	<i>B. montanum</i> (2)
	BOLU	26		Flat Creek	8/8/1991 (1)	9/12/2012	N	Good habitat, no cows.
	BOMI	163		Rose Ranch	6/2/1993 (6)	7/17/2013	N	<i>B. montanum</i> (6)
	BOMI		20	Trib. American Fork Sheep Creek	8/21/1996 (37)	9/12/2013 (29)	Y, S	<i>B. montanum</i> (2)
	BOMI	20	(4)	Flat Creek 215 Rd.	7/29/1991 (33)	9/12/2012 (10)	Y, S	Recent scouring and flooding, changes in stream course. Severe trampling and post-holing by cattle.
	BOMI		D (3)	Trib. to Flat Creek	8/8/1991 (55)	9/12/2012 (2)	Y	<i>B. montanum</i> (3)
17 (2)	BOPI	91		Roger's Mountain Trail	6/22/1995 (1)	8/19/2013	N	Surveyed area and beyond.
	BOPI		17	Lower Clinton Creek	9/18/1998 (1)			Site not reached.
	BOMI	233		Cy Creek off Kolle Creek	7/29/1993 (3)	9/18/2013	N	Quite a bit of habitat disturbances (landslides, heavy scouring, less shade).
	BOMI	102	(5)	Lower S Fork Rogers Creek	9/14/1998 (1)	8/19/2013 (2)	Y, S	<i>B. montanum</i> (3)
	BOMI	95	(2)	Mt. Rogers	8/20/1992 (13)	8/19/2013	N	
	BOMI	101	(2)	Kolle Creek	8/26/1992 (40)		Y	Voucher found and identification confirmed.

Appendix 2. Groups of Sites Revisited in 2012 and 2013 with Dates, Population Numbers and Comments, continued.								
Group # (# of days to Re-visit)	Species	EO#	FO# (#of Sub-populations)	Site Name	Sighting Date (# of Plants)	2012 and 2013 Survey Dates (# of Target Species)	Target Species Found <u>Yes/No</u> , <u>Specimen/Photo</u>	Comments, Other Species Names (# of Plants)
Groups of sites with under 100 plants at an individual site.								
18 (1)	BOPI		6	McInnis Rd. Meadow	6/20/1995 (2)	8/8/2013	N	
	BOMI		68	Trib. Big Meadow Lake	7/16/1998 (44)	8/8/2013 (126)	Y	<i>B. montanum</i> (196), <i>B. pinatum</i> (8)
	BOMI		66	N Pond Seldom Seen Mountain	9/28/1998 (22)	8/7/2013 (105)	Y, S	
	BOMI		67	S Trib. Meadow Creek S12	7/30/1998 (16)	8/8/13 (21)	Y, S	
	BOLU		20	Meadow Creek S2	7/9/1998 (4)	7/22/13 (2)	Y, P	<i>B. montanum</i> (1)
19 (1)	BOMI		8	Fritz Creek 404/410 Rds.	8/7/1995 (4)	7/24/2012 (13)	Y, S	Moderate-heavy blowdown, less shade.
	BOMI		12	Sherman B-Buttes 315/310	8/22/1995 (11)	7/18/2012	N	Site relocated.
	BOMI	88	(3)	Trib. to Trout Creek	7/8/1992 (88)	7/23/2012 (114)	Y, S	<i>B. montanum</i> (26). Habitat appears stable, evidence of recent scouring.
	BOMI	89		S15 Trib. 280 Rd.	7/9/1992 (14)	9/11/13 (6)	Y, S	<i>B. montanum</i> (18 )
	BOMI		10	Sherman 070/073 Rds. Marsh	8/16/1995 (17)	8/14/2013	N	Site not found, surrounding area surveyed.

Appendix 2. Groups of Sites Revisited in 2012 and 2013 with Dates, Population Numbers and Comments, continued.								
Group # (# of days to Re-visit)	Species	EO#	FO# (#of Sub-populations)	Site Name	Sighting Date (# of Plants)	2012 and 2013 Survey Dates (# of Target Species)	Target Species Found <u>Yes/No</u> , <u>Specimen/Photo</u>	Comments, Other Species Names (# of Plants)
Groups of sites with under 100 plants at an individual site.								
20 (1)	BOMI	78		Roes TS #6	5/18/1992 (60)	7/30/2013	N	
	BOMI	70	(4)	S Fork Little Boulder	8/8/1995 (22)	7/29/2013	N	
	BOMO	65		S Fork Little Boulder 252 Rd.	8/8/1995 (5)	7/29/2013	N	
	BOMI	48		Middle Fork Little Boulder Creek	8/21/1991 (46)	7/29/2013	N	
	BOMI	47	(2)	Trib. Middle Fork Boulder Creek	8/16/1991 (50)	7/30/2013 (19)	Y, S	
21 (1)	BOMI	235	(2)	Lodge Creek/Mosquito Point	7/23/1993 (16)			Voucher found and identification confirmed.
	BOMI	159	(2)	BJ	6/15/1993 (56)			Voucher found and identification confirmed.
22 (1)	BOMI	110		N Fork of S Fork Tacoma Creek	6/30/1993 (50)			Voucher found and identification confirmed.
	BOMI	150		Calispell Peak Creek Rd. 2341	8/23/1993 (1)			Not revisited, 0.75 mile walk-in.
	BOMI	160		S Fork Tacoma Creek	7/13/1993 (11)			Not revisited, 1 mile walk-in.
23 (1)	BOMI		E	N Fork Catherine Creek	8/10/1992 (27)	9/3/2013 (1)	Y	Revisited; 1 plant found, no voucher, no picture.
	BOMI		77	Tenas Mary Creek	7/13/1995 (50)	8/6/2012	N	Site relocated. Lots of blowdown, less shade, 60% canopy cover, cow sign in area, trampling, post-holing.
	BOMI		FO#F	E Fork LaFleur Creek	8/12/1992 (60)	8/2/2012 (66)	Y, S	

Appendix 2. Groups of Sites Revisited in 2012 and 2013 with Dates, Population Numbers and Comments, continued.

<b>Group # (# of days to Re-visit)</b>	<b>Species</b>	<b>EO#</b>	<b>FO# (#of Sub-populations)</b>	<b>Site Name</b>	<b>Sighting Date (# of Plants)</b>	<b>2012 and 2013 Survey Dates (# of Target Species)</b>	<b>Target Species Found <u>Y</u>/<u>N</u>, <u>S</u>pecimen/<u>P</u>hoto</b>	<b>Comments, Other Species Names (# of Plants)</b>
24 (1)	BOPI		108	N Fork Lone Ranch Creek	7/28/1997 (3)	9/4/2012	N	Site relocated. Habitat changed, creek undercut by 3 ft., recent scouring and flooding, washed to mineral soil.
	BOMI		G	N Fork Lone Ranch	7/1/1991 (3)			Unable to relocate sighting form, site not revisited.
	BOMI		59	6120_450 Rd.	8/31/2004 (60)		Y, P	Site not revisited, former BOCR site, Ferrar identified as <i>B. minganense</i> .
25 (1)	BOMIN	161		S Fork Tacoma Creek	7/12/1993 (17)	9/17/13 (32)	Y, S	<i>B. montanum</i> (6)
	BOMIN	162		N Fork of S Fork Tacoma Creek	7/7/1993 (49)			Site not revisited, 1.25 mile walk-in up creek.