SPECIES EVALUATION

Botrychium pallidum, Priority 1. *Botrychium pallidum* W. H. Wagner (BOPA12). grape fern, pale moonwort, pale botrychium. CNHP G2 / S2, Track A
FS: R2. -- G2G3 N2N3. CO S2, PSICC-Pikes Peak,ARP-Redfeather,MBR-Parks,SJ & RG-Columbine, Conejos Peak

Criteria	Rank	Confi-dence	Rationale	Sources of Information
1 Distribution within R2	**B**	**M**	Like several other moonworts, this species is small and inconspicuous, hence easily overlooked: "its range may be more continuous than our present knowledge indicates." Ranked in Colorado (S2), Maine (SR), Michigan (S3), Minnesota (S1), and Montana (S1).	Spackman and others 1999, Kolb and Spribille 2000, Weber and Wittmann 2001ab.
2 Distribution outside R2	**C**	**H**	"A tiny plant, *Botrychium pallidum* is separable from dwarfed and narrow sun forms of *B. minganense* by the peculiar, often folded pinnae and pale green to whitish color. ... Its small size may cause it to be overlooked. ... Manitoba, Ontario, Québec, Saskatchewan, Colorado, Maine, and Michigan" (Wagner and Wagner 1993). It has recently been found in northwestern Montana and northeastern Minnesota. Before *Botrychium pallidum* was described in 1990, these plants had been included in *B. minganense*, so a number of site records may be hiding in herbaria under that name.	MTNHP 2000, Minnesota Department of Natural Resources 2001, Wagner and Wagner 1990, Wagner and Wagner 1993.
3 Dispersal Capability	**D**	**L**	Dispersal mechanisms unknown, although the spores apparently live long and disperse widely in some species.	
4 Abundance in R2	**B**	**L**	An uncommon species in R2, but "demographic stochasticity" is irrelevant, especially in *Botrychium*, where genetic variation and breeding structure of populations is very poorly known. Twenty to thirty recorded occurrences in Colorado, three to five in Montana. Population counts vary from one to fifty individuals; but the plants are very small, very inconspicuous, and difficult to inventory at best. The Colorado distribution and population estimates must be considered tentative.	CNHP records, MTNHP 2000, Minnesota Department of Natural Resources 2001, Wagner and Wagner 1990, Wagner and Wagner 1993.
5 Population Trend in R2	**D**	**H**	Populations in Colorado so far have not been monitored. Given the difficulties of identification and the semi-ephemeral nature of some populations, monitoring would be a difficult task.	
6 Habitat Trend in R2	**B**	**M**	"Open exposed hillsides, burned or cleared areas, old mining sites, elevations 9,800–10,600 ft [2,980–3,230 m]" (Spackman and others 1999). "Although this species has only been found in high elevation subalpine forest wetlands in Colorado, throughout its distribution it has been located in a variety of native and disturbed habitats, including open exposed hillsides, burned or cleared areas, and old mining sites" (Thompson 2000). "Disturbance-derived habitats, both natural and anthropogenic ... often found in roadsides, old logging landings, and on overgrown roadbeds, often in association with strawberries (*Fragaria virginiana*) ... usually occur[ring] in 'genus communities,' aggregations of species of the same genus growing side-by-side" (Kolb and Spribille 2000). *Fragaria virginiana* (Virginia strawberry) is a common plant of moist, disturbed forest habitats, especially disturbed sites within one of the moister subalpine fir-Engelmann spruce (*Abies bifolia–Picea engelmannii*) forest types. "Areas kept open due to regular disturbance regimes (e.g., fire, grazing); primarily open fields, often associated with other moonworts, sea level to 2,600 m elevation." All moonworts are very sensitive to drought and may not appear above ground at all in hot dry years. These disturbed habitats are about stable; the sites that are being disturbed by the activities of humans are balanced by sites lost through increases in forest cover through protection from fire.	Lorain 1990, Spackman and others 1999, Thompson 2000, Kolb and Spribille 2000.

7 Habitat Vulnerability or Modification	**B**	**L**	"Vulnerable primarily to successional overgrowth of its habitat." Maintenance of these habitats will require habitat management to deliberately do so, it appears. We know very little about effects on *Botrychium pallidum* or its habitats by various kinds of disturbance activities.	Lorain 1990, Spackman and others 1999, Thompson 2000, Kolb and Spribille 2000.
8 Life History and Demographics	**D**	**H**	Details of life history and demographics known insufficiently to rank.	

National Forests in the Rocky Mountain Region where species is KNOWN (K) or LIKELY (L)* to occur:
*. Likely is defined as more likely to occur than not occur on the National Forest or Grassland. This generally can be thought of as having a 50% chance or greater of appearing on NFS lands.

COLORADO NF/NG	K	L		K	L		K	L
Arapaho-Roosevelt NF	K		NEBRASKA NF/NG			WYOMING NF/NG		
White River NF	K		Samuel R. McKelvie NF			Shoshone NF		
Routt NF		L	Halsey NF			Bighorn NF		
Grand Mesa Uncompahgre Gunnison NF	K		Nebraska NF			Black Hills NF		
San Juan NF	K		Ogalala NG			Medicine Bow NF		
Rio Grande NF	K		SOUTH DAKOTA NF/NG			Thunder Basin NG		
Pike-San Isabel NF	K		Black Hills NF			KANSAS NF/NG		
Comanche NG			Buffalo Gap NG			Cimarron NG		
Pawnee NG			Ft. Pierre NG					

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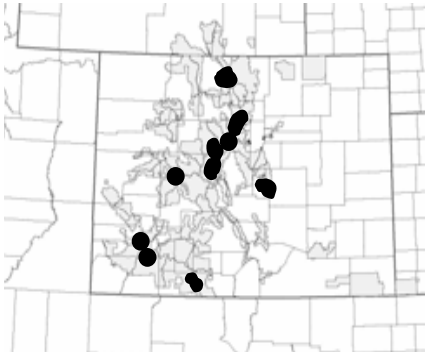
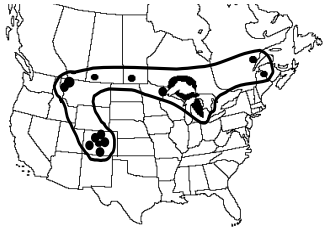
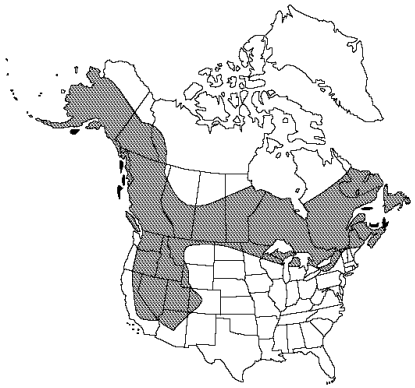


Botrychium pallidum in the Rocky Mountain Region



North American distribution of *Botrychium pallidum* (Wagner and Wagner 1993, Spackman and others 1999, Montana Natural Heritage Program 2000, Minnesota Department of Natural Resources 2001).



North American distribution of *Botrychium minganense* (Wagner and Wagner 1993).

SPECIES EVALUATION

Taxonomy. *Botrychium pallidum* was first described in 1990, from plants formerly identified as *B. minganense*. It seems apparent that several botanists are either ignoring this species or including it in *B. minganense*.

Discussion. This very small and inconspicuous species will undoubtedly have its range extended, as some have predicted (Wagner and Wagner 1998), both within R2 and across its large range; it cannot remain unknown in Wyoming for too much longer. We know very little about population sizes or genetic structure of populations, not to mention dispersal, of *Botrychium pallidum*. What is needed is more detailed searches for the species, which needs to include intense training by all field botanists, accompanied by at least basic population studies. Especially needed is information about the response of *Botrychium pallidum* to disturbance, both man-made and natural, and other habitat factors. Unfortunately, listing *B. pallidum* as a sensitive species will resolve none of these problems. Without this basic information, I cannot assess its viability status.

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Author and date: Barry C. Johnston, Botanist, Grand Mesa-Uncompahgre-Gunnison National Forests, 216 N. Colorado St., Gunnison, CO 81230-2197. (970) 642-4467. bcjohnston@fs.fed.us. Last modified September 30, 2002.