

# Moonwort Complex



Parks &  
Open Space

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It is difficult to differentiate among species of *Botrychium* and all of them are of conservation concern, so they are grouped together here as the Moonwort Complex.

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## Community Description

**Description:** *Botrychium* (moonwort) all produce one leaf per year, divided into two axes: one bearing an expanded, photosynthetic leaf, and the other containing spores. They are joined at a common stalk near the base.

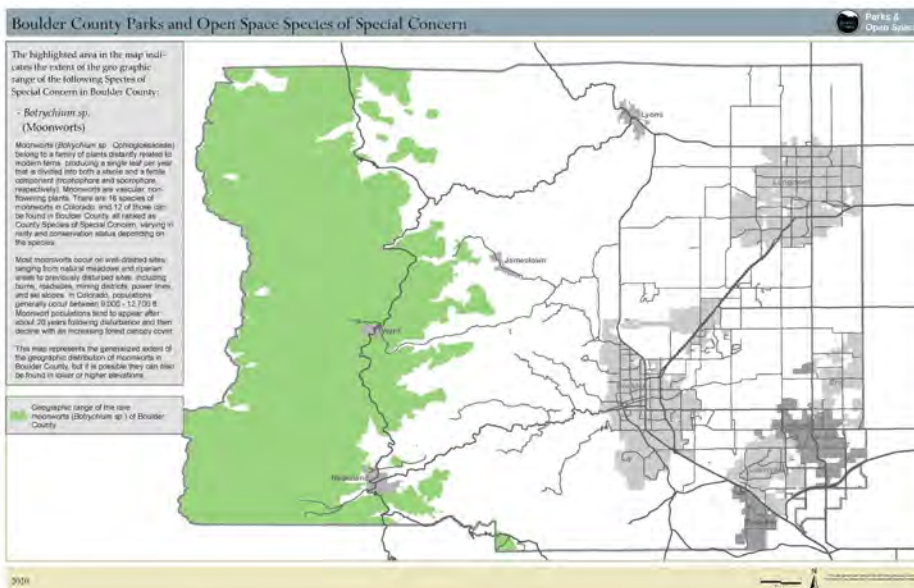
**Phenology:** Non-flowering.

**Look Alikes:** Some fern and fern ally families may resemble moonworts, but all moonworts are terrestrial (growing on soil or rocks), with leaves divided into a sterile, leaf-like segment and a fertile segment with a common stalk.

**Habitat:** Most moonworts occur on well-drained sites, ranging from natural meadows and riparian areas to previously disturbed sites, including burns, and roadsides. Populations generally occur above 9,000 ft. and tend to appear after about 20 years following disturbance. Moonworts then decline with an increasing forest canopy cover.

## Distribution & Range

## Species Include



Family: Ophioglossaceae

- *Botrychium campestre*
- *Botrychium echo*
- *Botrychium furculatum*
- *Botrychium hesperium*
- *Botrychium lanceolatum* var. *lanceolatum*
- *Botrychium lineare*
- *Botrychium neolunaria*
- *Botrychium minganense*
- *Botrychium pallidum*
- *Botrychium pinnatum*
- *Botrychium simplex*
- *Botrychium virginianum*

## Threats

**Livestock grazing & trampling:** Little is known about the amount of grazing that can be tolerated, and introduction of livestock to sites with moonwort is discouraged. Grazing animals can introduce exotic plants to the area.

**Off-road vehicle damage, camping, hiking:** Recreational activities in areas with moonwort can negatively affect them through ground disturbance, plant removal, sedimentation, and the introduction of non-native plants.

**Timber harvest and firewood cutting:** The impacts of timber harvest can disrupt soil processes and lead to changes in light and the loss of soil nutrients and moisture.

**Exotic plant introduction and herbicide treatment:** Invasive plants can replace moonworts in their native habitats, and herbicides used to control invasive plants have been shown to kill the moonwort as well.

**Road maintenance:** Initial road construction and maintenance may actually create habitat for moonworts since they tend to occur in recently disturbed but now stable habitats. However, continuous disturbance like road maintenance may directly affect populations.



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## Management Considerations

**Coordinate management actions with**

**BCPOS:** Potential locations can be reported to BCPOS to help with planning and conservation. BCPOS can help with:

- **Documentation:** If stands of the moonwort complex are identified, landowners should map or monitor these areas with BCPOS.
- **Agriculture/grazing:** Grazing by livestock should be excluded from stands.
- **Habitat preservation:** Maintain current light regimes, hydrology, habitat, and microclimatic conditions of areas with moonwort populations. Impacts to the soil should be minimized. Disturbance can disrupt and minimize mycorrhizal diversity.
- **Invasive Plant Management:** If possible, mechanical removal of invasive species is ideal (i.e., hand-pulling or using hand tools to remove invasive species).
- **Fire Management:** BCPOS can help determine if fire management would be an effective tool to fight invasive species.



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2021

The areas displayed in this map indicate known and potential locations of the following species of special concern in Boulder County:

## *Botrychium complex*



Moonwort species

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The Moonwort Complex consists of 12 species of rare moonworts that are known or likely to be present in Boulder County. Moonworts are non-flowering species that belong to a family of plants distantly related to ferns. In Colorado, the rarity of moonworts ranges from critically imperiled (S1) to vulnerable (S3), and they are listed as Boulder County Species of Special Concern. They are all of conservation concern due to threats including livestock grazing, off-road vehicle damage, timber harvest and invasive species.

This map shows only known locations from documented herbaria records in the county, and where there is a potential for the species to occur based on its known elevation range.

