Global Distribution:	Found throughout western North America; present in northeastern North America with large gaps. ⁵¹				
Alaska Distribution:	Aleutian Meadows, Alaska Range Transition, Coas Mountains Transition, Coastal Rainforests.				
Ecoregions Occupied:	Alaska Peninsula, Alaska Range, Kluane Ranges, Gulf of Alaska Coast, Alexander Archipelago.				
Conservation Status:	S2S3 G3; BLM Sensitive.				



Description^{51, 52, 53, 54}



- General: Frond divided into dissimilar vegetative blade (trophophore) and spore-bearing segment (sporophore); perennial, 5 to 13 cm tall.
- **Trophophore:** Sessile or stalk up to 30% of total trophophore length; blade yellow-green, up to 6 cm long and 2 cm wide, once pinnately divided; pinnae in up to 6 pairs, strongly ascending, well separated, fan-shaped, margins sharply toothed and often shallowly incised into 2 to 5 lobes, prominently veined; 1st (lowest) and 2nd pinnae pairs approximately equal in size and shape; distance between 1st and 2nd pairs; extra sporangia often present on the 1st pair.
- **Sporophore:** Sporophore stalk approximately ½ the total length of the trophophore; twice pinnately-divided at base of sporangial cluster, branches dense and lying close to the rachis.







Ecology

Elevation:	In Alaska, predominantly known from near sea level to 50 m but also from up to 1,440 m in mountains; ⁴⁹ up to 3,200 m elsewhere in western North America. ⁵¹			
Landform:	Beaches, beach ridges, spits, beach meadows, coastal dunes, riparian meadows, mountain slopes.			
Soil Type:	Sand, gravel, scree; ⁴⁹ <i>Botrychium</i> gametophytes require mycorrhizae to grow beyond a 2- to 3-cell stage and reproduce, and sporophytes require mycorrhizae to develop enough to produce above ground leaves. ⁵⁵			
Moisture regime:	Moist to mesic.			
Slope:	Flat to moderately sloped.			
Aspect:	No particular aspect.			
Vegetation type:	Sparsely vegetated, forb-graminoid meadow, alder thicket, willow thicket, alpine willow scrub.			
Associated species:	Achillea millefolium, Alnus viridis ssp. sinuata, Castilleja unalaschcensis, Fragaria chiloensis, Leymus mollis, Salix pulchra, Salix richardsonii.			
Longevity:	Long-lived perennial with a persistent rhizome that produces one leaf per year; ⁵⁵ when collecting, remove only the above-ground portion with a knife. ⁵⁵			
Phenology:	Leaves appear late spring to mid-summer; ⁵² rhizomes of <i>Botrychium</i> species can remain dormant and produce no above ground growth for one to three years. ⁵⁵			
Population estimate:	There are seventeen known occurrences in Alaska; above ground populations of <i>Botrychium</i> species are often small and scattered; ⁵⁵ below ground population of gametophytes and juvenile sporophytes at various developmental stages can occur at significantly higher densities. ⁵⁵			

- **Reproductive biology:** Spores of *Botrychium* species filter into soil and germinate in darkness;⁵⁵ self-fertilization is dominant, gametophyte density below ground often exceeds juvenile sporophyte density;⁵⁵ mortality rate of juvenile sporophytes is high;⁵⁵ sporophytes grow for several years below ground before the apex of the rhizome produces a leaf that emerges above ground;⁵⁵ sporophytes of *Botrychium ascendens* also reproduce vegetatively by gemmae.⁵¹
- **Herbivory:** Above ground leaves of *Botrychium* species often regrow from rhizomes one to several years after disturbances such as herbivory or fire with no decrease in plant vigor.⁵⁵

Similar Species^{51, 52, 53, 54}

Several other *Botrychium* species that occur in Alaska can be easily confused with *Botrychium ascendens*, and distinguishing characteristics are often difficult to recognize. The table below shows morphological traits that distinguish *Botrychium* species that occur in Alaska with basal pinnae that span less than 120°.

Species	Trophophore	Basal Pinnae	Pinnae Margins	Sporophore
Botrychium ascendens	Sessile or stalk up to 30% of total trophophore length, yellow-green	Fan-shaped, blade spanning arc less than 90°	Coarsely toothed, if divided into segments then symmetrically cleft into 2 to 4 spreading lobes; junction of lower margin with outer margin sharp-angled	Sporophore stalk approximately ½ total trophophore length
Botrychium spathulatum	Sessile, shiny yellow-green	Spatulate to fan- shaped, blade spanning arc less than 90°	Entire or irregularly and shallowly cleft into rounded and non- spreading lobes; junction of lower margin with outer margin rounded	Sporophore stalk approximately ½ total trophophore length
Botrychium minganense	Stalk usually up to 20% of total trophophore length, rarely sessile; dull green	Narrowly fan- shaped to oblong, blade spanning arc less than 120°	Entire to symmetrically and shallowly 3- to 5- lobed	Sporophore stalk ½ or more the total trophophore length
Botrychium campestre var. lineare	Sessile or stalk up to 1 cm long; pale green	Linear, blade spanning arc less than 45°	Commonly bifid with spreading and linear lobes	Sporophore stalk ¹ / ₃ or less the total length of the trophophore
Botrychium montanum	Stalk 0.3 to 1.5 cm long; dull green, glaucous	Pinnae poorly developed, often confluent	Trophophore blade often appearing to have 2 to 4 angular lobes at tip	Not branched below the upper $^{2}/_{3}$