IMPORTANT PLANT AREA NOMINATION FORM – MONTANA

Nominated Site Name: Logan Pass

General Location: The Logan Pass IPA is located in the center of Glacier National Park approximately 30 miles northeast of Columbia Falls.

Site Coordinates: Latitude/longitude coordinates (NAD83 / WGS84) are: Approximate centroid- 48°41.134'N 113°43.625'W, northernmost point- 48°43.950'N 113°40.583'W, southernmost point- 48°35.105'N 113°39.798'W, easternmost point- 48°41.625'N 113°34.000'W, westernmost point- 48°35.924'N 113°47.059'W.

Maps/Photographs: Five maps are provided: (1) All SOC species by category (bryophyte/pteridophytes, monocots, dicots), (2) SOC bryophytes and pteridophytes in Logan Pass IPA, (3) SOC dicot vascular plants in Logan Pass IPA, (4) SOC monocot vascular plants in Logan Pass IPA (5) Vegetation types of the Logan Pass IPA.

Counties: Logan Pass IPA straddles the Continental Divide in both Flathead and Glacier counties.
Elevation: The lowest point of the Logan Pass IPA is north of Heavy Runner Mountain along Reynolds Creek at approximately 5,100 ft. The highest Point is approximately 10,000 ft on Mount Siyeh. Nearly all of the IPA is above treeline.

Size of Area: 26770 acres

Property Ownership: National Park Service (NPS)

Other designations for the site: As part of the Waterton-Glacier International Peace Park (the world's first formally designated peace park, 1932), the site has a number of special designations. Except for a corridor spanning 200 meters either side of the Going-to-the-Sun Road, the site is in proposed wilderness, and is thus managed as wilderness by NPS policy. Glacier and Waterton Lakes National Parks were both designated as Biosphere Reserves by the United Nations Educational, Scientific and Cultural Organization (UNESCO) Man and Biosphere Reserve Program in 1976 and 1979 respectively. The entire peace park was designated a World Heritage Site in 1995 by UNESCO's World Heritage Committee. The world heritage site is currently under review for threatened status.

Table 1. Vascular plant species of concern at Logan Pass IPA

Species	MNHP rank	Last Obs.	Population Size	Trend	Source
Botrychium lineare	G2?/S1	2005	ca. 40	Unknown	Barton unpublished
Carex plectocarpa	G2/S1	2009	2500	Stable	Lesica 2009
Cystopteris montana	G5/SH	1932	Unknown	Unknown	McLaughlin 1935
Draba macounii	G3G4/S1	2002	ca. 80+	Downward	Lesica & McCune 2004

Euphrasia subarctica	G5/S1	2002	ca. 120+	Downward	Lesica & McCune 2004
Festuca vivipara	G4G5/S1	1994	Unknown	Unknown	MONTU database
Gentiana glauca	G4G5/S1	2002	ca. 855	Downward	Lesica & McCune 2004
Juncus albescens	G5/S1	2002	ca. 90+	Stable	Lesica & McCune 2004
Kobresia simpliciuscula	G5/S2	2002	ca. 270+	Stable	Lesica & McCune 2004
Lycopodium lagopus	G5/S1	2006	1 clone?	Unknown	Lesica & Crone 2007
Papaver pygmaeum	G3/S1	2006	Unknown	Unknown	Lesica & Crone 2007
Pinguicula vulgaris	G5/S3	2002	ca. 400+	Stable	Lesica & McCune 2004
Poa laxa banffiana	G5?T1/S1		Unknown	Unknown	
Potentilla uniflora	G5S1	1964	Unknown	Unknown	MONTU database
Ranunculus gelidus = R. verecundus	G5/S2	1991	Unknown	Unknown	MONTU database
Salix barrattiana	G5/S1	1996	"large colonies	Unknown	MONTU database
Thelypteris phegopteris	G5/S2	2000	Unknown	Unknown	Lesica photo
Toefieldia pusilla	G5/S2	2002	ca. 365+	Stable	Lesica & McCune 2004
Trichophorum alpinum	G5/S1	2009	"small colony	Unknown	Lesica 10,252 (MONTU)
Trichophorum cespitosum	G5/S2	2009	Unknown	Unknown	Lesica photo

Table 2. Bryophyte species of concern at Logan Pass IPA.

Species	MNHP rank	Last obs.	Population size	Trend	Source
Calliergon richardsonii	G4/S1	pre1970	Unknown	Unknown	MNHP data
Calliergon trifarium	G4/S1	pre1970	Unknown	Unknown	MNHP data
Grimmia mollis	G3G5/S1	pre1970	Unknown	Unknown	MNHP data
Meesia uliginosa	G4/S1	pre1970	Unknown	Unknown	MNHP data
Paludella squarrosa	G3G5/S1	pre1970?	Unknown	Unknown	MNHP data
Paraleucobryum enerve	G5?/S1	pre1970	Unknown	Unknown	MNHP data
Pseudocalliergon turgescens	G3G5/S1	pre1970	Unknown	Unknown	MNHP data

Trend Information: Trend information comes from two sources:
Lesica, P. and B. McCune. 2004. Decline of arctic-alpine plants at the southern margin of their range following a decade of climatic warming. Journal of Vegetation Science 15: 679-690.
Lesica, P. and E. E. Crone. 2007. Monitoring Vital Signs in Glacier National Park Rare Plant Monitoring Protocols. Submitted to Glacier National Park, West Glacier MT.

Threats: The threats to rare plant species within the Logan Pass IPA are relatively minor. Some populations occur near hiking trails or climbing routes and may be subject to hiker trampling. The probability of damage is quite low, with perhaps certain populations of *Carex plectocarpa* being the most susceptible. However, recent surveys show no evidence of decline in the populations most vulnerable to trampling. Hydrologic changes may be having more of an impact (Lesica 2009). Monitoring of selected populations

over the past decade shows some species appear to be remaining stable, while others have declined indicating potential for further decline during a warmer, dryer climate. The *Botrychium lineare* population occurs on a road shoulder and is subject to visitor trampling and disturbance by maintenance activities such as mowing, plowing, gravel, and weed treatment. The threat level of many populations is unknown, but significant threats are not expected for most of these populations.

Table 3. Summary of Threats to Vascular Plant Species in Logan Pass IPA

Species	**Threats**	**Level**
Botrychium lineare	Road maintenance/plow/gravel/mow	Moderate
Botrychium lineare	Weed treatment	Moderate
Botrychium lineare	Trampling by visitors and vehicles	Moderate
Carex plectocarpa	Trampling by hikers	Moderate
Carex plectocarpa	Infrastructure development	Low
Cystopteris montana	Unknown	
Draba macounii	Climate change	Moderate
Euphrasia subarctica	Climate change	Moderate
Festuca vivipara	Trampling by hikers	Low
Gentiana glauca	Climate change	Moderate
Juncus albescens	Trampling by hikers	Low
Kobresia simpliciuscula	Trampling by hikers	Low
Lycopodium lagopus	Unknown	
Papaver pygmaeum	Trampling by hikers	Low
Pinguicula vulgaris	Unknown	
Poa laxa banffiana	Unknown	
Potentilla uniflora	Trampling by hikers	Low
Ranunculus gelidus	Unknown	
Salix barratiana	Unknown	
Thelypteris phegopteris	Visitor disturbance	Very low
Toefieldia pusilla	Trampling by hikers	Low
Trichophorum alpinum	Unknown	
Trichophorum cespitosum	Unknown	

Justification: The Logan Pass area harbors an exceptional number of peripheral and disjunct arctic-alpine plants at the southern edge of their geographic range.

The Logan Pass IPA was delineated to include 20 vascular plant species listed as S1 or S2 by the Montana Natural Heritage Program (*Pinguicula vulgaris* is listed as S3 but perhaps should be S2). *Carex plectocarpa* (=*C. lenticularis* var. *dolia*) is known only from Glacier National Park and two disjunct sites in southwest Montana and northwest Wyoming, and the largest known population in the world is included in the Logan Pass IPA. The IPA encompasses a population of the globally rare *Botrychium lineare*. The IPA has the only known Montana populations for *Gentiana glauca*, *Lycopodium lagopus*, *Draba macounii* and *Cystopteris montana* (population hasn't been seen since 1932). Two of three known Montana populations of *Euphrasia subarctica* occur in the Logan

Pass IPA. *Thelypteris phegopteris* is usually a forest plant, but occurs in an unusual cliff-face habitat in the Logan Pass area. Six species of moss listed as S1 by the Montana Natural Heritage Program have been found in the Logan Pass area. Four of these are known from nowhere else in Montana. Boundaries of the IPA were drawn to include all of the above SOC populations and to be primarily high subalpine and alpine plant communities in the headwaters of the St. Marys River. The primary non-forested vegetation map classes in the area include dwarf shrub/herbaceous communities both in the dry to mesic and mesic to wet ranges, as well as white dryad dwarf shrublands and cliff/talus sparse vegetation communities.

Plant Communities of the Logan Pass IPA The Dwarf-shrub/Herbaceous Complex: Dry - Mesic (CSA) map class captures dwarf-shrub and/or herbaceous vegetation in mesic to dry conditions and is abundant throughout the alpine and subalpine, occasionally in the upper montane. Areas mapped with CSA tend to dry out by mid-summer; desiccating winds and warm exposures contribute to drought-like conditions. Wind exposure can prevent little winter snow cover and result in a short and temporary supply of meltwater in summer months. Although vegetation can be of high cover, it was typically of lower density due to its dryness. The Dwarf-shrub/Herbaceous Complex: Dry - Mesic map class represents 24 associations. Quite common to the CSA map class in the subalpine, both east and west of the continental divide (CD), are *Xerophyllum tenax* Herbaceous Vegetation and *Vaccinium membranaceum* / *Xerophyllum tenax* Shrubland. Very common to the CSA map class, in the alpine on wind-swept calcareous areas, are *Dryas octopetala - Carex rupestris* Dwarf-shrub Herbaceous Vegetation and *Dryas octopetala - Polygonum viviparum* Dwarf-shrub Herbaceous Vegetation, although the latter is not as common as the former. Also, commonly captured by the CSA map class in the alpine are two sedge communities, *Carex albonigra - Myosotis asiatica* Herbaceous Vegetation and Carex paysonis - *Sibbaldia procumbens* Herbaceous Vegetation.

The Dwarf-shrub/Herbaceous Wet Complex: Mesic - Wet (CSW) map class captures dwarf-shrub and/or herbaceous vegetation on slopes or in slight depressions where adequate moisture is available for much of the season. Although it ranges from low montane to high alpine, it is most prevalent in subalpine and alpine. There are similarities in plant communities and landscape position between the CSW map class and the Dwarf-shrub/Herbaceous Wet Complex: Dry - Mesic (CSA) map class. Yet, the CSW map class represents sites that are more favorably moist. A common site for the CSW map class is moist meadows in the alpine and subalpine retaining significant snow accumulation well into the summer months, particularly in slight striated depressions (e.g., the area along the Logan Pass boardwalk trail). Other common locations for the CSW map class are on mountain slopes, particularly of east and north aspects, retaining snow accumulations into the growing season. The CSW map class was often used to map areas of receding glaciers with the newly exposed rock continually wet from glacial melt throughout the growing season where areas of exposed rock are >10% vegetated. Often times, the alpine meadows could be described as a mosaic of the CSW and CSA map classes, with slight micro-topographic changes from mesic depressions (CSW) to drier bedrock exposures (CSA). The meadow along the Logan Pass boardwalk trail offers a good example of this.

The Dwarf-shrub/Herbaceous Wet Complex: Mesic - Wet (CSW) map class represents 24 associations. One of the more common associations captured by the CSW map class in

the alpine throughout the entire Waterton-Glacier IPP project is *Carex nigricans* - *Sibbaldia procumbens* Herbaceous Vegetation, which often exists in small patches associated with long-persisting snowbeds. Also common in the alpine, both east and west of the CD, is *Juncus parryi* / *Sibbaldia procumbens* Herbaceous Vegetation, where snow deposition occurs and meltoff is relatively late in the season. Likewise, common in the alpine are *Salix arctica* - (*Salix petrophila*, *Salix nivalis*) / *Polygonum bistortoides* Dwarf-shrubland, *Salix arctica* / *Carex nigricans* Dwarf-shrubland, *Carex paysonis* - *Sibbaldia procumbens* Herbaceous Vegetation, *Carex scirpoidea* - *Zigadenus elegans* Herbaceous Vegetation, and *Arenaria capillaris* / *Polytrichum piliferum* Herbaceous Vegetation, with the latter occurring in the drier alpine. Common in small patches, in the high subalpine and alpine, are *Luzula glabrata* var. *hitchcockii* - *Erythronium grandiflorum* Herbaceous Vegetation and *Phyllodoce glanduliflora* / *Sibbaldia procumbens* Dwarf-shrubland, with the former typically in late-persisting snowpack sites. Common throughout in the subalpine in subirrigated cold sites is *Valeriana sitchensis* - *Veratrum viride* Herbaceous Vegetation.

The White Dryad Dwarf-shrubland (DWD) map class, which represents only two associations—*Dryas octopetala* - *Carex rupestris* Dwarf-shrub Herbaceous Vegetation and *Dryas octopetala* - *Polygonum viviparum* Dwarf-shrub Herbaceous Vegetation, is prominent to high-subalpine and alpine east of the CD and is less prominent west of the CD. It is typically positioned in the landscape on calcareous substrates in wind-swept locations, giving the characteristic of alternating patterns between dwarf-shrub and exposed rock.

The Cliff/Talus Sparse Vegetation (VCT) map class is quite common to the map, with occurrence concentrated to the subalpine and alpine. It is common above the tree line on steep rocky slopes and talus scree. The VCT map class was used to map areas in the alpine and subalpine—occasionally within the montane—having <10% total vegetation cover. Herbaceous, dwarf-shrub, shrub, tree, and nonvascular vegetation grow in rock fixtures or on the rock surfaces. The VCT map class was also used to map areas of receding glaciers, with the newly exposed rock continually wet from glacial melt throughout the growing season, yet with <10% dwarf-shrub and herbaceous vegetation. The Cliff/Talus Sparse Vegetation (VCT) map class represents ten associations. Because of the extreme locations these communities persist in, little is known of their commonality to the VCT map class. Yet, we venture that the most common association mapped with VCT is *Saxifraga bronchialis* Scree Slope Sparse Vegetation, occurring over a broad elevation range. Also broadly distributed and commonly captured in the VCT map class is *Penstemon ellipticus* Dwarf-shrubland on slopes of thin soils in warm exposure settings. Also common to the VCT map class is *Arenaria capillaris / Polytrichum piliferum* Herbaceous Vegetation, occurring in the alpine and high subalpine (Hop et al. 2007).

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References:

Hop, K., M. Reid, J. Dieck, S. Lubinski, and S. Cooper. 2007. U.S. Geological Survey-National Park Service Vegetation Mapping Program: Waterton-Glacier International Peace Park. U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin, August 2007. 131 pp. + Appendixes A-L.

Lesica, P. 2009. Monitoring Populations of *Carex plectocarpa* at Logan Pass and Akaiyan Lake. Unpublished Progress Report, Glacier National Park, West Glacier, MT.

McLaughlin, W.T. 1935. Notes on the flora of Glacier National Park, Montana. Rhodora 37:362-365.