

SIGNATURE PAGE
SPECIAL INTEREST AREA ESTABLISHMENT RECORD

Bangtail Botanical and Paleontological Special Interest Area

Gallatin National Forest
Gallatin and Park Counties, Montana

The undersigned certify that all applicable land management planning and environmental analysis requirements have been met and that boundaries are clearly identified.

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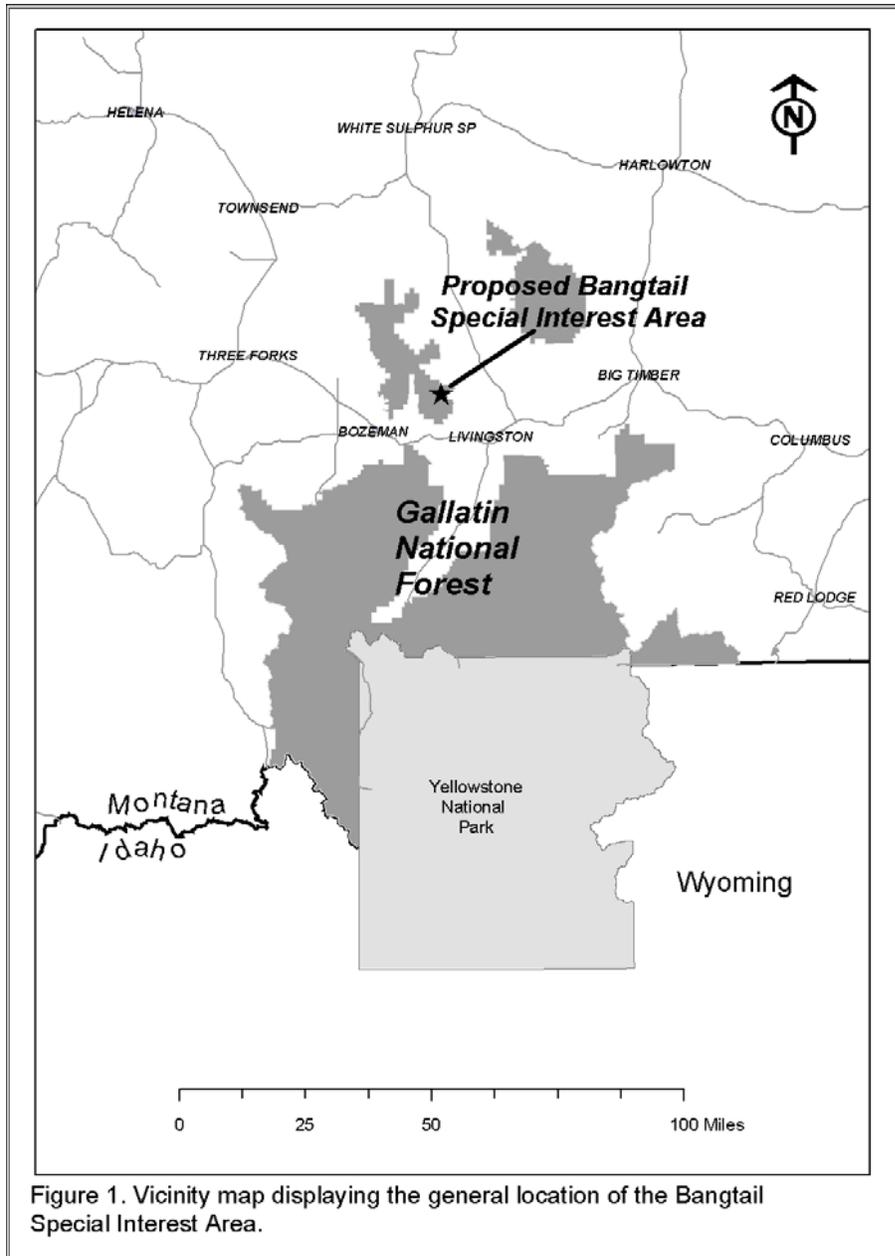
Bangtail Botanical and Paleontological Special Interest Area

**ESTABLISHMENT RECORD FOR
BANGTAIL BOTANICAL AND PALEONTOLOGICAL SPECIAL INTEREST AREA**

**GALLATIN NATIONAL FOREST, BOZEMAN RANGER DISTRICT,
GALLATIN AND PARK COUNTIES, MONTANA**

INTRODUCTION

The Bangtail Botanical and Paleontological Special Interest Area (Bangtail SIA) is located on the Bozeman Ranger District of the Gallatin National Forest, within the Northern Region of the USDA Forest Service, and near the city of Bozeman, Montana (Figure 1). The Bangtail SIA provides for research opportunities on mountain meadow and sub-alpine ecosystems, and also includes research sites for important paleontological resources from the Tertiary period of North America (Houde 1981). This area is representative of landscapes that extend from central Wyoming (Knight 1994) to northern Montana (Habeck 1987), and is comparable to bunchgrass ecosystems of Asia and the Andes. As a resource for scientific studies it is unique because it is accessible and has supported thirty years of prior research. Valuable baseline data are thus available for both present and future studies. Its accessibility and history make it well suited for gathering information on natural resource management issues. Designation of the Bangtail SIA will help maintain the ecological integrity of the site for ongoing and future research studies, and will serve to protect high-quality examples of these grassland habitats and paleontological sites.



Land Management Planning

A report describing the importance of the Bangtail area was prepared and submitted to the Gallatin National Forest in 2003 by Dr. Tad Weaver, a professor and plant ecologist at Montana State University. A Special Interest Area proposal was developed by the Forest Service, and in July 2004, USFS staff from the Gallatin National Forest (Jose Castro, Reggie Clark, John Councilman, Rachel Feigley) and the Region 1 Regional Office (Mary Manning, Steve Shelly), along with Dr. Weaver, surveyed the proposed SIA and developed a potential boundary for the area. In consultation with the Forest Geologist (Mary Beth Marks), this boundary was subsequently revised to include the significant paleontological resources in the area. In 2007 an environmental assessment supporting the establishment of this Special Interest Area was completed. This document is attached as Appendix 1.

OBJECTIVES

The objectives of Special Interest Areas as identified in Forest Service Manual 2370 are to protect, and where appropriate foster public use and enjoyment of, areas with scenic, historical, geological, botanical, zoological, paleontological, or other special characteristics. The overall management objective for Bangtail Botanical and Paleontological Special Interest Area is to maintain natural conditions and processes of the features of the area. Specific objectives of the Bangtail SIA are:

- 1) To preserve a mountain meadow/sub-alpine forest complex for long-term study by those interested in natural processes occurring in habitats managed for no use or light use by livestock, wildlife, and non-motorized recreationists.
- 2) To encourage study of natural resource issues, such as management of exotic plant species and the effects of fire in bunchgrass meadows.
- 3) To encourage the study of ecological processes occurring in bunchgrass meadows, including biomass production, decomposition, nutrient cycling, and recovery of small-scale disturbances.
- 4) To preserve a little-impacted example of this landscape for educational use and informal observation by interested citizens.
- 5) To provide protection and continued study opportunities for important bird and mammal paleontological resources.

JUSTIFICATION

The USDA Forest Service regularly uses research information in making natural resource management decisions. The agency contributes to this research by providing sites through the establishment of Special Interest Areas and Research Natural Areas. The Bangtail SIA is uniquely valuable for several reasons:

- 1) The area is representative of the mountain meadow/sub-alpine forest ecosystems that are widespread in the northern Rocky Mountains. Therefore, research done on the Bangtail SIA will be directly applicable not only on the Gallatin National Forest, but from central Wyoming (Knight 1994) to the Canadian border (Habeck 1987). There are very similar habitats in the Bighorn Mountains, the Teton Range, and local mountain ranges in southwestern Montana, including the Gallatin, Madison, Beartooth, Big Belt, Little Belt, Gravelly, and Elkhorn ranges, many of which have also been studied in association with research on whitebark pine and limber pine. Data gathered in the Bangtail SIA may also be compared with information collected in cool temperate grasslands of the Andes and Asia. The area is unique in having been very well researched compared to other high mountain grasslands in the northern Rocky Mountains.

- 2) The area is accessible to the research staff of Montana State University, as well as to the Forest Service, and local researchers in the U.S. Geological Survey, Natural Resources Conservation Service, and the Montana Department of Fish, Wildlife and Parks. This accessibility has supported research over the past thirty years. Past research will support ongoing studies and those planned for the future. The area is also accessible to the public as an interpretive site.
- 3) For a high-elevation site (7000-8000 ft.) in the northern Rocky Mountains, the Bangtail SIA has an unequalled volume of baseline research. These results are useful for comparisons with long-studied montane sites in the Gravelly Mountains (Mueggler 1971, 1972) and central Wyoming (Knight 1994).
- 4) Ecological and experimental research is both ongoing and planned for the Bangtail SIA. Subjects include: invasion of exotic plants; fire effects (from natural and prescribed fire); effects of climate change; forest growth patterns and the distribution of vegetation in meadow/forest ecosystems as related to soils and weather patterns; cloud seeding; grassland ecosystem function and productivity; nitrogen and other nutrient cycles; ungulate grazing; and decomposition.
- 5) The paleontological sites are very important in that recent finds indicate the area supports important and unique fossils (see “Principal Distinguishing Features”).
- 6) The area was the subject of extensive weather modification experiments in the mid-1960s and 1970s (Weaver and Super 1973). These experiments provide one of the few statistically sound demonstrations of successful winter cloud seeding.

PRINCIPAL DISTINGUISHING FEATURES

Wildlife

The area supports numerous birds and large and small mammals, and includes habitat for the endangered Canada lynx. Pac *et al.* (1991) summarized long-term studies of deer and elk presence in the Bangtail range. Haglund (1972) and Weaver and Haglund (1974) conducted surveys of small mammals, and Weaver and Haglund (1974) surveyed birds and insects. Weaver and Smolik (1987) examined nematode populations.

Vegetation

Grasslands of deep-soil sites in the Bangtail SIA consist mainly of the Idaho fescue/timber oatgrass (*Festuca idahoensis/Danthonia intermedia*) habitat type (Weaver pers. comm. 2003). Production of grasslands has been measured nearly every year between 1969 and 2000 (Weaver and Haglund 1974; Weaver pers. comm. 2000).

Several forest habitat types (Pfister *et al.* 1977) have been identified within the Bangtail SIA (Weaver pers. comm. 2000). These primarily consist of sub-alpine fir/grouse whortleberry (*Abies lasiocarpa/Vaccinium scoparium*) and sub-alpine fir/elk sedge (*Abies lasiocarpa/Carex*

geyeri). Young lodgepole pine (*Pinus contorta*) forests occupy most of these sites, due to fires of the last century and logging of the last 10-20 years. Rockier and more wind-swept sites, especially those with south and west aspects, contain a strong limber pine (*Pinus flexilis*) component. Limber pine is infected to varying extents with white pine blister rust (Weaver pers. comm. 2000). The Douglas-fir/elk sedge (*Pseudotsuga menziesii/Carex geyeri*) habitat type occupies southwest slopes. Deep soil grassland sites with reduced wind support tree rings and ribbon forests (Billings 1969; Buchanan 1972).

Most of the area has largely been protected from exotic plants by lack of disturbance. However, recent logging has introduced species not formerly present, especially Canada thistle (*Cirsium arvense*). Additional species of noxious weeds are found in proximity to the area or could be found within the Bangtail SIA. These include houndstongue (*Cynoglossum officinale*), musk thistle (*Carduus nutans*), spotted knapweed (*Centaurea maculosa*), common tansy (*Tanacetum vulgare*), and others.

A preliminary vascular plant species list for the Bangtail SIA is included in Appendix 2.

Paleontological resources

The Bangtail SIA lies in the Crazy Mountain Basin, which contains rock formations preserving one of the longest continuous records of Paleocene terrestrial and freshwater life (approximately 55-65 million years ago). The basin is rich in fossil mammals, including those from the 10 million years closely following the demise of the dinosaurs and appearance of mammals. Studying fossils in the area is important to understanding mammalian evolution and also the evolution of climate and global ecosystems through the beginning of the Cenozoic era (Krause and Maas 1990).

LOCATION

Bangtail SIA occurs on reserved federal lands on the Bozeman Ranger District of the Gallatin National Forest, Gallatin and Park counties, Montana (Figure 2). The SIA is located in portions of Sections 5, 6, 7, and 8, Township 1S, Range 8E; all of Sections 30 and 31, Township 1N, Range 8E; and Section 25 (all) and portions of Section 36, Township 1N, Range 7E, Principal Meridian, Montana.

Boundary

The boundary description prepared by the Forest Surveyor is attached as Appendix 3 to this establishment record.

Area

The total area of the SIA is approximately 3366 acres (1363 ha).

Elevation

Elevation within the SIA ranges from 7500 feet (2286 m) to 7900 feet (2408m).

Access

The Bangtail SIA is located about 22 miles by road northeast of Bozeman, Montana, in the Bangtail Mountains. To access the area, travel northeast from the city of Bozeman on State Highway 86 for a distance of approximately 12 miles to the Olsen Creek Road (Forest Road 6944). Turn right onto the Olsen Creek Road. Follow this road east to the ridge then south approximately 10 miles to the Bangtail SIA.

The Gallatin National Forest, Bozeman Ranger District, administers all lands within the area.

Maps

Land ownership, roads, and physical features of the general area are mapped at a scale of ½ inch per mile on the USDA Forest Service Visitors Map, Gallatin National Forest, East Half. Topographic coverage of the Bangtail SIA is provided by the USGS 7.5 minute Grassy Mountain, Gobblers Knob, Hoppers, and Bozeman Pass quadrangles.

Photos

Aerial photographic coverage is provided by Forest Service 2005 aerial photo flights:

Flight line 14, photos 1405-90 through 1405-100

Flight line 15, photos 1405110 through 1405-118.

Photos are on file at the Bozeman Ranger District Office, and at the Forest Supervisor's Office, in Bozeman, Montana. General photos displaying the landscape, vegetation and surrounding area are contained in Appendix 4. Additional photographs are on file at the Bozeman Ranger District.

PHYSICAL AND CLIMATIC CONDITIONS

Physical Features

The Bangtail SIA features montane meadows and sub-alpine forests located along the crest of the Bangtail Mountain Range. The area lies immediately east of the Bridger Mountains, south of the Big Belt Mountains, west of the Crazy Mountains, and north of the Gallatin Range in southwestern Montana. The topography of the land in and around the SIA consists of mountain ridgelines and slopes.

The soil survey for the Gallatin National Forest (USFS and NRCS 1996) indicates that fine-loamy, mixed Argic Cryoborolls and loamy skeletal, mixed Typic Cryoborolls are predominant in the SIA. Clay silt soils in the area are derived more from blowing loess than from decomposition of sandstones (Buchanan 1972). Long-term loess deposition in the meadows is about 0.5mm/year.

Geology of the area uniformly consists of andesitic sandstones of the Fort Union formation (Buchanan 1972). There are thick beds of dark sandstone interbedded with thinner beds of shale and siltstone (USFS and NRCS 1996).

Climatic Conditions

Temperatures can exceed 90 degrees Fahrenheit in the summer, and drop to – 40 degrees Fahrenheit in the winter. Precipitation averages 70 inches annually. Extensive on-site meteorological data have been gathered in this area (Buchanan 1972; US International Biological Program).

MANAGEMENT DIRECTION IN THE GALLATIN LAND MANAGEMENT PLAN

Establishment of the Bangtail SIA required that Amendment #20 of Gallatin National Forest Land and Resource Management Plan (1997) be amended to include the Bangtail Special Interest Area as Forest Plan Amendment #28. Amendments to Amendment #20 are described in the Environmental Assessment for the establishment of the Bangtail Botanical and Paleontological Special Interest Area (2007; Appendix 1). The Forest Plan management area goal for SIAs states: “Special Interest Areas provide protection for unusual or uncommon botanical features, such as rare plants or plant communities, and are designated for study and public enjoyment.”

The following describes the specific Gallatin Forest Plan management direction for the Bangtail SIA.

Goals

- Maintain this area to provide continued research and interpretive opportunities. Manage the area primarily for the scientific study of mountain meadows and their interaction with surrounding forest.
- Protect and maintain the geological and paleontological resources for further research and interpretation.
- Protect and maintain the area so that natural ecological processes prevail.

Objectives

- Develop a research and monitoring plan in cooperation with Montana State University and the Rocky Mountain Research Station by 2010.

Standards and Guidelines

- Forest-wide standards and guidelines apply.

Site-Specific Standards and Guidelines

Recreation:

- Recreation Opportunity Spectrum classes include primitive, semi-primitive motorized, and semi-primitive non-motorized (S).
- See Forest Standards in Forest Plan Chapter II (S).

Visual Quality:

- See Forest-wide Standards in Forest Plan Chapter II (S).

Wildlife and Fish:

- Wildlife and habitat improvements are allowed when they meet the objectives of the Special Interest Area (G).

Range:

- Livestock grazing is not allowed unless permitted prior to establishment of the Bangtail SIA (S).

Timber:

- Classified as unsuitable for timber production (S).

Water and Soils:

- See Forest-wide Standards in Forest Plan Chapter II.

Minerals:

- Locatable – Withdraw from mineral entry, or remove from mineral entry through the notation rule, subject to valid existing rights (S).
- Mineral Material - This area is not available for mineral material entry (S).

Landownership:

- Evaluate application for special use permits on a case-by-case basis (S).

Facilities:

- Evaluate the construction of facilities on a case-by-case basis. All improvements are in compliance with the overall goals of the Bangtail SIA (S).

Fire:

- Select the wildfire suppression response to minimize disturbance of the Bangtail SIA. Utilize Minimum Impact Suppression Tactics (G).

Access:

- Motorized access is restricted to designated routes with no off-road or off-trail access except as authorized under administrative use (Gallatin National Forest Travel Plan 2006) (S).
- Rip old road surfaces if needed to allow vegetation to reestablish (G).
- The area will be posted as a research area and the cooperation of users requested. Non-motorized public access will not be restricted (G).

Site Interpretation:

- At this time no on-site interpretative developments are recommended. Off-site interpretative displays and brochures can be developed as interest and resources permit (G).

MONITORING

Ongoing and proposed research projects will be monitored according to their study design. Those persons conducting the research will be responsible for monitoring their studies.

A 20-acre enclosure has been protected from domestic livestock grazing and fire since 1935. The integrity of the fence around the enclosure needs to be monitored and repairs completed to preserve the 'natural condition' and to protect experiments being conducted there. The fence will be repaired annually. Fencing materials will be provided by the Forest Service. Those persons conducting research at the site will be responsible for annual maintenance of the fence.

Forest Plan grazing utilization standards and guidelines will be followed. Grazing permittees will be reminded of these standards and guidelines during annual meetings and correspondence. Monitoring of grazing utilization will be conducted annually. This will be completed by the Bozeman Ranger District Rangeland Management Specialist.

Annually monitor the area for exotic plants and particularly for noxious weeds. This will be completed by walking through unroaded portions of the area each year. All roads and trails will be monitored by walking or driving. Weed locations will be identified with a GPS and their locations included in the annual Forest weed monitoring update. Exotic plant populations will be controlled with as little effect on native plants as possible. Herbicide application techniques such as wicking and spot spraying with backpack sprayers will be used as much as practicable. These control activities will be completed by the District Invasive Species Program Manager and the Bozeman Ranger District Rangeland Management Specialist.

Vehicle access will be monitored to minimize disturbance of the vegetation and experiments. This monitoring will be completed by the Bozeman Ranger District Law Enforcement Officer and employees of the Bozeman Ranger District.

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Appendix 1

Bangtail Botanical and Paleontological Special Interest Area Environmental Assessment to be included here.....

Appendix 2

Plant Species List

Field reconnaissance of the Bangtail Proposed Botanical SIA was conducted on July 28, 2004. The following partial species list was compiled by Steve Shelly, with assistance from Rachel Feigley, Tad Weaver (MSU), Mary Manning, and Reggie Clark.

TREES

Abies bifolia (= *A. lasiocarpa*)
Juniperus communis
Pinus contorta
Pinus flexilis
Pseudotsuga menziesii

SHRUBS

Artemisia ludoviciana
Artemisia michauxiana
Artemisia tridentata ssp. *vaseyana*
Rosa gymnocarpa

FORBS

Achillea millefolium
Agastache urticifolia
Agoseris aurantiaca
Agoseris glauca
Allium cernuum
Anaphalis margaritacea
Anemone multifida
Anemone patens
Antennaria corymbosa
Apocynum androsaemifolium
Arenaria congesta
Arnica fulgens
Arnica latifolia
Astragalus miser

Besseyia wyomingensis
Bupleurum americanum
Campanula rotundifolia
Castilleja sp.
Chaenactis douglasii
Cerastium arvense
Cirsium arvense
Clematis hirsutissima
Collomia linearis
Cymopterus sp.
Delphinium bicolor
Delphinium occidentale
Douglasia montana
Epilobium angustifolium
Epilobium sp.
Erigeron speciosus
Eriogonum flavum
Eriogonum ovalifolium
Eriogonum umbellatum
Frasera speciosa
Gaillardia aristata
Galium boreale
Geranium viscosissimum
Geum triflorum
Heterotheca villosa
Heuchera sp.
Lewisia rediviva
Linum lewisii
Lupinus sericeus
Mimulus guttatus
Mimulus lewisii

Oxytropis lagopus
Oxytropis sericea
Penstemon sp.
Phacelia hastata
Polemonium sp.
Polygonum sp.
Potentilla gracilis
Potentilla hippiana
Rudbeckia occidentalis
Sedum lanceolatum
Senecio integerrimus
Senecio canus
Silene sp.
Taraxacum officinale
Thlaspi arvense
Townsendia parryi
Zigadenus venenosus

GRASSES AND GRAMINOIDS

Bromus carinatus
Carex microptera
Carex petasata
Dactylis glomerata
Danthonia intermedia
Festuca idahoensis
Koeleria macrantha
Melica bulbosa
Phleum alpinum
Poa pratensis
Pseudoroegneria spicata
Stipa occidentalis

Appendix 3

LEGAL DESCRIPTION

Bangtail Botanical and Paleontological Special Interest Area

GALLATIN NATIONAL FOREST
Bozeman Ranger District
PRINCIPAL MERIDIAN, MONTANA

Gallatin County, Montana

T.1N., R.7E.:

Section 25, all fractional

Lots 1, 2, 3, 6 and 7, W $\frac{1}{2}$ NE $\frac{1}{4}$ and NW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 36

Park County:

T.1N., R.8E.:

Section 30, all fractional

Section 31, all fractional

T.1S., R.8E.:

Lots 3 and 4, S $\frac{1}{2}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$ Section 5

Lots 1 and 2, S $\frac{1}{2}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$ Section 6

E $\frac{1}{2}$ Section 7

W $\frac{1}{2}$ W $\frac{1}{2}$ Section 8

Aggregate area: 3366.26 acres

Parcel description and acreage is based upon GLO survey record. No additional monuments were set.

Janet Kempff, 10806 LS, MT.

Date

Appendix 4

Photos





Bangtail Botanical and Paleontological Special Interest Area



Bangtail Botanical and Paleontological Special Interest Area



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