Browns Peak Research Natural Area (RNA) Supplemental Information Report
Assessment in Response to Discretionary Review of Appeals to MBNF LRMP

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Introduction and Background

In the Chief's Appeal Decision of 02/16/06, the Regional Forester was instructed to supplement the FEIS with documentation of how the established evaluation and selection criteria were utilized to evaluate Browns Peak for designation as a Research Natural Area. "It is not clear how the evaluation and selection criteria applied to other areas under consideration were applied to Browns Peak." The Regional Forester was also instructed to disclose in the FEIS how snowmobile use in Browns Peak would modify ecological processes or otherwise interfere with the objectives for which the area was designated.

FSM 4063.03 – Policy
The selection and establishment of Research Natural Areas within the National Forest System primarily emerges from continuing land and resource management planning and associated environmental analyses (FSM 1920 and FSM 1950). Forest plans shall include analysis of, and recommendations for, the establishment of proposed Research Natural Areas. Where proposals to establish Research Natural Areas arise outside of the forest planning process, the affected Forest Supervisor shall prepare, as part of an establishment record (FSM 4063), a forest plan amendment in accordance with land management planning regulations (36 CFR 219.10(f) and FSM 1922.5) and environmental analysis policy and procedures (FSM 1950 and FSH 1909.15).

The objectives of establishing Research Natural Areas are to:

1. Maintain a wide spectrum of high quality representative areas that represent the major forms of variability found in forest, shrubland, grassland, alpine, and natural situations that have scientific interest and importance that, in combination, form a national network of ecological areas for research, education, and maintenance of biological diversity.
2. Preserve and maintain genetic diversity, including threatened, endangered, and sensitive species.
3. Protect against human-caused environmental disruptions.
4. Serve as reference areas for the study of natural ecological processes including disturbance.
5. Provide onsite and extension educational activities.
6. Serve as baseline areas for measuring long-term ecological changes.
7. Serve as control areas for comparing results from manipulative research.
8. Monitor effects of resource management techniques and practices.

The MBNF used the Draft Research Natural Area Program Guide and Matrix (Andrews 1993) to assess (evaluate) the different proposed Research Natural Areas. The RNA Matrix was developed as a tool for identifying the ecological elements targeted for inclusion in the RNA system. The RNA matrix used the Series level of plant associations based on climax dominant overstory plant species because plant communities are estimators of ecological variables. This series level was considered to be compatible with the Hierarchical Framework of Ecological Units (Bailey 1989, Bailey et al. 1994) as well as Society of American Foresters (SAF) cover types (Eyre 1980), Kuchler types (Kuchler 1964) and what was to become the terrestrial ecological system classification for the United States (Grossman et al. 1998, Anderson et al. 1998, Jennings et al. 2003 and Comer et al. 2003).

The RNA Matrix (Andrews 1993) included elements targeted for inclusion in the RNA system and information about plant associations and community types for assessment of RNA objectives.

CRITERIA (from Andrews 1993)

1. Quality (how well a site represents the targeted ecosystem type or protected biodiversity elements);
2. Condition (how much the site has been degraded or altered from natural or optimal conditions);
3. Viability (the likelihood of long-term survival for the ecosystem and its protected biodiversity);
4. Defensibility (extent to which the ecosystem and biodiversity elements can be protected from extrinsic human factors).

Evaluation of Browns Peak (following Andrews 1993)

Elevation: 10,400 – 11,600 feet.

Size: 472 acres

The area was recommended for an RNA by the public.

The area consists of an alpine plant communities on scree (an accumulation of broken rock fragments on a slope) with high elevation mosses and lichens interspersed Engelmann Spruce and Subalpine fir.

WYNDD Area Rank B3 –High significance such as any other good or fair occurrence of a G2 taxon (see NatureServe code explanations at end of document), a very good occurrence of a G3 taxon, an excellent occurrence of any vegetation community, or a concentration (4+0 of excellent or very good occurrences of (G4 orG5) S1 taxa (Welp et al.2000 , MBNF LRMP FEIS Appendix F-8).

Browns Peak may be one of the last known locations of the white-tailed ptarmigan (G5/S1, and R2 sensitive on the MBNF) on the MBNF (MBNF LRMP Appendix D-20, Beauvais 2001, Braun 1988, Hoffman 2006) and provides habitat for Medicine Bow pika, *Ochotona princeps ssp figginsi* (G5/S3, MB species of local concern) (MBNF LRMP Appendix 114).

Snow pack depth is commonly over 10 feet in this part of the Snowy Range, with drifts reaching 30 feet or more in the lee of rock outcrops (MBNF LRMP FEIS Appendix C-110). Ice covers the lakes at the base of Browns Peak from mid-October to June, and spring snowmelt dominates hydrology (Nydick et al. 2004).

The Snowy Range area has the highest average wind speed in the continental United States and bare patches of ground are found along side the drifts and at the highest elevations (e.g. top of Browns Peak) (MBNF LRMP FEIS Appendix C-110, Oolman et al. 2008).

About one third of the Browns Peak RNA is steep, with rocky sideslopes, scree and talus and borders the Shelf Lakes. About two thirds of the RNA is less steep.

Soils in the area are generally shallow and rocky with rounded to rugged alpine landforms. Frost-free periods are quite short, with higher elevation northern aspects having very few frost-free days (MBNF LRMP FEIS C-110).

Quality:

Area represents high alpine types, not represented in any other RNAs on the MBNF. Ribbon forests are present but not to the extent in other parts of the Snowy Range. Although not the only proposed RNA with Ribbon Forests, this is the only selected RNA with ribbon forests. Marsh marigold/tufted hairgrass plant association identified as rare and sensitive in Biological Diversity Assessment amendment to the Rocky Mountain Regional Guide, May 1992 (USDA FS Rocky Mountain Region. 1992) is probably present.

Plant Associations and Gaps Filled:

1. Subalpine-fir-Spruce/moss (Abla-Pien/moss –*Abies lasiocarpa-Picea engelmannii*/moss);
2. Gooseberry currant/ Jacob's ladder (Rimo/Popu --*Ribes montigenum/Polemonium pulcherrimum*);
3. Golden Avens/American Bistort (Acro/Bibi2 - *Acomastylis rossii* [also known as *Geum rossii*]-*Bistorta bistortoides* [also known as *Polygonum bistortoides*]);
4. Marsh marigold/Red pod stonecrop (Cale/Clrh –*Caltha leptosepala/Clementsia rhodantha*);
5. Arctic willow/golden avens (Saar/Acro –*Salix arctica/Acomastylis rossii*).

Browns Peak is the only alpine RNA for the Medicine Bow National Forest. It shares some elements with the existing nearby Snowy Range RNA. Ribbon forests are present in the Browns Peak RNA but not to the extent in other parts of the Snowy Range. Although not the only proposed RNA with Ribbon Forests, this is the only selected RNA with ribbon forests.

Condition:

This area has few factors that degraded or altered it from natural or optimal conditions. It was probably grazed in the past, although its elevation and rockiness limited the access and the lack of forage didn't make it very desirable for grazing. There are historic sheep trails at the base of the peak (Molvar 2001).

There are few exotics (Welp 2000, Mills and Neighbours 1995).

The Snowy Range Sheep allotment encompasses the Brown's Peak RNA. It is currently vacant (Weatherd 2008). These allotments have been vacant for the last 4 years (prior to 2003) and have received non-use 7 of 10 years before that.

Climate change and nitrogen deposition may be influencing the condition of this area (Mussleman et al. 1997).

Viability

Browns Peak is a high elevation peak where alpine ecosystems processes are thought to be currently working well (see information above on nitrogen deposition and climate change). Wind, snow, geological substrate and topography are major forces in the formation of vegetation and plant communities.

Defensibility

There are current maintained hiking trails that surround the area on all but the northeast side. The USGS topographic maps show Circle Trail as completing the trail system on the northeast side, however the Forest Service does not maintain this piece of trail (Willard personal communication 2008). The foot traffic on these trails is primarily associated with destinations other than Browns Peak and there is no trail up to the top of Browns Peak. Some snowmobile use may occur but the area is known for its extreme rockiness and high winds so does not offer an ideal snowmobile experience.

The Browns Peak RNA lies within the inventoried roadless area (IRA) R20617 Snowy Range which is a total of 29,637 acres (MBNF LRMP FEIS Appendix C-110). There are several outfitter and guiding operations including snowmobile touring, backpacking, horseback trips, fishing and big game hunting within the Snowy Range IRA. There is continued public interest for outfitting special use permits in the Snowy Range IRA.

The surrounding area is management area MA1.33 – Areas are managed to provide backcountry recreation opportunities in a landscape with a natural appearance. Summer use is nonmotorized. Winter motorized use is allowed during the snow season. This MA is intended to have mineral entry withdrawal and does not have suitable timber.

Mining Claims – see discussion in the following section on Management Concerns and Possible Conflicts:

Defensibility is good to very good.

Assessment Criteria:
The Browns Peak Area appears to meet assessment criteria for a research natural area.

Plant and Animal Species:
Most of the MBNF occurs below 10,000 feet in elevation. Only about 5% of the MBNF lies above 10,000 feet in elevation, so the plants and animals that inhabit this zone are naturally rare on the MBNF.

The Browns Peak area is potential ewe/lamb summer range for bighorn sheep but is disconnected from yearlong range at lower elevations in the Douglas Creek area and along the North Platte River (MBNF LRMP FEIS Appendix C-110).

Rare Animals:
The general area provides the only summering habitat in the world for the brown-capped rosy finch, and year-round habitat for the endemic Medicine Bow collared pika. The general area was also one of the last documented occurrences of the white tailed ptarmigan on the MBNF (Welp 2000).

Other rare animals that are known to inhabit the area are:
- Dwarf shrew (*Sorex nanus*);
- Pygmy shrew (*Sorex hoyi*).

Rare Plant Species:
The site supports 10 regionally endemic of state rare alpine species (Welp 2000):
- Alpine kitten tails (*Besseya alpina*);
- Golden saxifrage (*Saxifraga chrysantha*);
- Blackhead fleabane (*Erigeron melanocephalus*);
- Artic harebell (*Campanula uniflora*);
- Dane's gentian (*Gentianella tenella*);
- Common moonwort (*Botrychium lunaria*).

The Snowy Range IRA which includes Browns Peak has one of only two populations of alpine kittentails in Wyoming and the only occurrence of golden saxifrage in the Medicine Bow Range occurs in the Browns Peak RNA portion of the Snowy Range IRA.

Other rare plants that occur in the nearby Medicine Bow Peak Special Interest Area that probably have habitat in the Browns Peak RNA include (Welp 2000, Roche 2008):

- American Alpine Ladyfern (*Athyrium alpestre var. americanum*);
- Whitish gentian (*Gentiana algida*);
- Bolander's quillwort (*Isoetes bolanderi var. bolanderi*);
- Parry's primrose (*Primula parryi*).

Geology:

Browns Peak consists of white quartzite with mafic intrusions that are more easily weathered. The Medicine Peak Quartzite (1700 m thick) was deposited on a slowly subsiding marine shelf and, consists of coarse-grained quartzite containing quartz pebble layers (Lanthier 1979).

The north half of the Snowy Range (Browns Peak area) contains granite and gneiss that are older than 2.6 billion years, overlain by metamorphosed sedimentary rocks, quartzite and schist. The crest of the range is composed of quartzites that have been turned on end to form spectacular cliffs. The southern part of the range contains much younger granite around 1.4 billion years (MBNF LRMP FEIS C-110).

The Medicine Bow Peak (adjacent to Browns Peak) is almost pure quartzite with primary sedimentary structures which collectively suggest intertidal to shallow subtidal paleo-environments. Among the primary structures are nine distinct morphological types of sediment-filled tubes. They are dubiofossils whose morphology, size-frequency, orientation, and distribution relative to bedding suggest a biologic origin. These tubes are most similar to, but not yet provable as, metazoan trace fossils (Kauffman and Steidtmann 1981). These fossils may also occur on Browns Peak.

During glaciation, the ice in the vicinity of Browns Peak was perhaps 800 to 1,000 feet (244 to 305 m) thick during Bull Lake glaciation (corresponding to the Illinoian glaciation of the mid-continent 175,000 to 140,000 years ago) and again later during the Late Pinedale glaciation (25,000 to 12,000 years ago). There were smaller glaciers several thousand years ago during the Neoglaciation, which started about 4,000 years before present (Munn and Kinter 2002).

Management Concerns and Possible Conflicts:

Mining:

There is no active mining within the RNA or immediately adjacent. There has been mineral exploration for diamonds west of the Snowy Range IRA because of the proprietary nature of this exploration there is no public information available. The green quartzite found in the south part of the Snowy Range IRA has been withdrawn from mineral entry. There is an historical mining district that stretches from south of Centennial, WY to Sand Lake but the mineral potential documented in that area has not been documented in the vicinity of Browns Peak (MBNF LRMP FEIS C110-112).

Grazing:
The Snowy Range Sheep allotment encompasses the Brown's Peak RNA. It is currently vacant (Weatherd 2008). These allotments have been vacant for the last 4 years (prior to 2003) and have received non-use 7 of 10 years before that (MBNF LRMP FEIS Appendix C-112).

Timber:
The timber within the RNA is considered unsuitable.

Special Features
The Glacier Lakes Ecosystem Experiments Site (GLEES) is nearby and provides a site for alpine research that would compliment the reference area elements of the Browns Peak RNA. The Medicine Bow Peak Special Interest Area is nearby and provides a comparison area for botanical interests.

Effects of snowmobile use in Browns Peak on ecological processes and the objectives for which the area was designated.

Winter recreation, primarily motorized use, creates snow compaction that affects the environment beneath the snow and the early season growing conditions for plants underneath the snow. Recreation activities that compact or move snow can change water distributions and timing and change growing conditions for vegetation (Bilbrough et al. 2000, Williams et al. 1998, Neumann and Merriam 1972, Musselmann and Korfmacher 2007) and affect wildlife habitat (Jarvinen and Schmid 1971, Schmid 1972, Keddy et al. 1979). Changes in snowmelt affect the growth of vegetation at high elevations where snowpack is controlling factor for vegetation growth (Knight et al. 1975). Where the snow is compacted on a yearly basis, this can create changes in vegetation patterns that persist for decades (Knight et al. 1975).

Natural process of wind, sun and temperature changes can also result in hard dense snow (Blanchard 1919, Sturm 2002). Snow pack depth is commonly over 10 feet in this part of the Snowy Range, with drifts reaching 30 feet or more in the lee of rock outcrops (Heimstra et al. 2006). The Snowy Range area has the highest average wind speed in the continental United States (15m/second, 33 miles/hour Oolman et al. 2008) and bare patches of ground are found alongside the drifts and at the highest elevations (e.g. top of Browns Peak).

The Browns Peak RNA consists of a convex slope exposed to high winds on all sides. About 1/3 of the area within the Browns Peak RNA can be described as steep, rocky scree and talus.

All of these factors (wind, snow irregularities, extreme slope, extreme rockiness) all contribute to the RNA not being ideal for snowmobiling. There are probably a few extreme snowmobile riders that would use this area on occasion when the snow conditions allowed access.

Since the natural processes that shape the ecosystem in this area include snow, wind and extreme sun in both winter and summer, it is likely that is considerable snow hardening that occurs due to these natural processes. It is unlikely that the snow compaction created by humans on machines could be distinguished from that produced by natural processes.

Conclusion:
The potential Research Natural Areas on the MBNF were assessed as suitable for designation and were graded by Andrews (1999). The grades did not convey any absolute meaning but were used to

indicated their suitability as potential RNAs. In the Chief's Appeal Decision of 02/16/06, the Regional Forester was instructed to supplement the FEIS with documentation of how the established evaluation and selection criteria were utilized to evaluate Browns Peak for designation as a Research Natural Area. In comparing the Browns Peak RNA to the other potential RNAs that were evaluated by Andrews (1999), the Browns Peak RNA is given a grade of B+.

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NatureServe Conservation Status Codes (NatureServe 2009)

Global Conservation Status Codes

G#G#: NatureServe Global Conservation Status Rank, Range Rank — A numeric range rank (e.g., G2G3) is used to indicate the rank of uncertainty in the status of a species or community. Ranges cannot skip more than one rank (e.g., GU should be used rather than G1G4). For more information see NatureServe Conservation Status (NatureServe 2009).

G1: NatureServe Global Conservation Status Rank, Critically Imperiled — At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors. For more information see NatureServe Conservation Status (NatureServe 2009).

G2: NatureServe Global Conservation Status Rank, Imperiled — At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors. For more information see NatureServe Conservation Status (NatureServe 2009).

G3: NatureServe Global Conservation Status Rank, Vulnerable — At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors. For more information see NatureServe Conservation Status (NatureServe 2009).

G4: NatureServe Global Conservation Status Rank, Apparently Secure — Uncommon but not rare; some cause for long-term concern due to declines or other factors. For more information see NatureServe Conservation Status (NatureServe 2009).

G5: NatureServe Global Conservation Status Rank, Secure — Common; widespread, and abundant. For more information see NatureServe Conservation Status (NatureServe 2009).

GH: NatureServe Global Conservation Status Rank Presumed Eliminated (historical) (Ecological Communities): Presumed eliminated throughout its range, with no or virtually no likelihood that it will be rediscovered, but with the potential for restoration, for example, American Chestnut (Forest) (NatureServe 2009).

GH: Global NatureServe Global NatureServe Status Rank, Possibly Extinct (Species) — Missing; known from only historical occurrences, but still some hope of rediscovery (NatureServe 2009).

Subnational Conservation Status Rank Codes

S#S#: NatureServe Subnational Conservation Status Rank — Range Rank—A numeric range rank (e.g., S2S3) is used to indicate the range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU should be used rather than S1S4) (NatureServe 2009).

S?: NatureServe Subnational Conservation Status Rank — Unranked—State/Province conservation status not yet assessed (NatureServe 2009).

S1: NatureServe Subnational Conservation Status Rank — Critically Imperiled—Critically imperiled in the state or province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state or province (NatureServe 2009).

S2: NatureServe Subnational Conservation Status Rank — Imperiled—Imperiled in the state or province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state or province (NatureServe 2009).

S3: NatureServe Subnational Conservation Status Rank — Vulnerable—Vulnerable in the state or province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation (NatureServe 2009).

S4: NatureServe Subnational Conservation Status Rank — Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors (NatureServe 2009).

S5: NatureServe Subnational Conservation Status Rank — Secure—Common, widespread, and abundant in the state or province (NatureServe 2009).