Research Natural Area

Name: Little Costilla Peak

Location:

State: NM County: Taos & Colfax Forest: Carson District: Questa
T. 30 N R. 16 E S. 15 (Us)

Geology:

Description:

East side: Jurassic and Triassic rocks undivided: red, gray, and brown shale and sandstone; light-gray cross-bedded dune sandstone; lensing limestone conglomerate.

Northwest quarter: Sangre de Cristo formation: maroon to brownish-red, arkosic conglomerate; motley or brown, red and variegated sandstone; thin, nodular non-arkosic limestone; siltstone and shale.

Southwest quarter: Precambrian granite: massive, pink to pinkish-orange, porphyritic granite

Reference:

New Mexico State Highway Department, , Geology And Aggregate Resources District V; map 8: nm Hwy Dept., Santa Fe, nm.

Climate: Loc 8/-1

TES Gradient:

Precipitation: ___ Annual: 33 in. Warm season (May - Oct.)= 61 %
Cool Season (Nov. - Apr.)= 39 %

Mean Annual Snow: 79 in.

Mean Temperature: Annual 28 °F Jul. 54 °F Jan. 16 °F
Freeze Free Period: 40 days

Mean Temperature: Annual ___ °F Jul. ___ °F Jan. ___ °F
Freeze Free Period: ___ days

Trewartha's climate type: E Boreal

Reference: Forest Service, 1986, Terrestrial Ecosystem Handbook; Appendix B: USDA FS R3

Soils:

ESTABLISHMENT REPORT

LITTLE COSTILLA PEAK RESEARCH NATURAL AREA

USDA FOREST SERVICE
SOUTHWESTERN REGION
CARSON NATIONAL FOREST
QUESTA RANGER DISTRICT
TAOS AND COLFAX COUNTIES, NEW MEXICO

Prepared by: _____ Date 7/1/87
William W. Dunmire, The Nature Conservancy
Mollie S. Toll, Department of Biology,
University of New Mexico

Recommended by: _____ Date 12/21/87
Ron Thibedeau, District Ranger
Questa Ranger District

Recommended by: _____ Date 1/4/88
John Bedell, Forest Supervisor
Carson National Forest

Recommended by: _____ Date 1/5/88
John W. Russell, Chairman
Southwestern Research Natural Area Committee

Recommended by: _____ Date 4/15/88
Sotero Muniz, Regional Forester
Southwestern Region

Recommended by: _____ Date May 16, 1988
Charles M. Loveless, Station Director
Rocky Mountain Forest and Range Experiment Station

The abovesigned certify that all applicable land management planning and environmental analysis requirements have been met and that boundaries are clearly identified in accordance with FSM 4063.21, Mapping and Recordation and FSM 4063.41 5.e(3) in arriving at this recommendation.

ESTABLISHMENT RECORD

for

LITTLE COSTILLA PEAK RESEARCH NATURAL AREA

within

Carson National Forest

Taos and Colfax Counties, New Mexico

INTRODUCTION

Not in Forest Plan

The Little Costilla Peak Research Natural Area comprises approximately 650 acres (263.0 hectares) in de Cristo Mountains of north-central New Mexico. The RNA is located in the Questa Ranger District, Carson Forest, in Taos and Colfax Counties, and is all acqui Forest land.

Alpine tundra has been noted as an important high-elevation ecosystem for protection within the RNA program (USFS Regional Guide, 1983: Table 3-1). In July, 1982, a task group of the Regional RNA Committee investigated several candidate tundra areas proposed by the Carson National Forest. The Task Group concurred that Little Costilla Peak constituted the only real opportunity to provide suitable representation.

LAND MANAGEMENT PLANNING

The need for representation of this biotic community was identified in the Southwestern Regional Guide (August 1983) although this particular site was not identified by name. The Carson National Forest Plan, implemented December 8, 1986, does not include the Valle Vidal portion of the Forest. The Little Costilla Peak, McCrystal Meadow, and Clayton Pass proposed Research Natural Areas are within the Valle Vidal. The Forest is presently working on an amendment to the Forest Plan to include the Valle Vidal. It is anticipated that the environmental analysis (or EIS) prepared for the amendment will support the establishment of the three proposed Research Natural Areas. In the meantime the areas are designated for protection in the Multiple Use Area Guide for the Valle Vidal which has been approved by the Regional Forester. The management of the Valle Vidal will be governed by the Multiple Use Area Guide until the Forest Plan is amended to include the Unit.

JUSTIFICATION STATEMENT FOR ESTABLISHMENT OF AREA

Little Costilla Peak Research Natural Area was identified primarily as an outstanding example of an alpine tundra ecosystem. This is an important high-elevation ecosystem in the Southwest. The need to include such an ecosystem within the RNA network of the Southwestern Region has been stated in the Regional Guide (USFS 1983).

Little Costilla Peak should be added to the RNA system as it provides a secluded discrete unit for alpine study. The entire alpine community here can be considered fellfield, one of several important communities in the alpine of New Mexico. The alpine in New Mexico is unique due to its geographic location at the

southern tip of the Rocky Mountains. This allows rapid evolution of new genetic variations and provides an unparalleled opportunity for studies in plant systematics.

PRINCIPAL DISTINGUISHING FEATURES

Little Costilla Peak is a small isolated alpine island including all slope aspects from an elevational range of 11,400 feet (3474.7 m) to 12,584 feet (3835.6 m). Alpine conditions here are dry, windswept, and exposed. On the west side of the peak, a turf of Kobresia bellardi occupies the lower third of the alpine, with talus and loose gravel above. The gentle slopes on the windswept south side allow little snow accumulation and receive very high summer insolation. Here are found essentially fellfield plant communities with a high coverage of lichens. The best examples of krummholz are found on the east side of the peak, where dwarf Engelmann spruce (Picea engelmannii) and bristlecone pine (Pinus aristata) occur. On steep northwest-facing slopes from 11,400 feet (3474.7 m) to timberline is a tract of closed spruce-fir forest.

LOCATION

Little Costilla Peak is in the Valle Vidal unit of the Questa Ranger District, Carson National Forest. The area is located roughly 25 miles (40.2 km) northeast of Questa, New Mexico, in the Ash Mountain USGS 15′ quadrangle (latitude 36°50′,longitude 105°13′), Township 30 N, Range 16 E, Sections 15, 16, 21, and 22 (Map 1). The boundary east of the high divide follows the 11,800 ft contour. From a point at 11,800 ft on the high divide south of Little Costilla Peak the west boundary descends in a northwest direction to the 11,400 ft contour and follows this contour to a point in a ravine northwest of Little Costilla Peak. The boundary then proceeds easterly up this ravine to the high divide at 11,640 ft and thence southerly along the high divide where it joins the boundary east of the high divide. Elevations within the RNA range from 11,400 ft (3470 m) to 12,584 ft (3840 m), and the area comprises approximately 650 acres (263 ha). The proposed RNA is an irregular[illegible] including all slope aspects of the peak from an el[illegible] approximately 11,800 feet (3596.7 m) to the summi[illegible] split along the north-south divide by the Taos-Co[illegible] line. The proposed RNA comprises approximately 65[illegible] hectares).

There are two choices for access to this RNA require many miles of non-motorized travel. The access point is easily traveled in a passenger ve the year when the Forest Road 1950 to the Valle Vidal unit is open (Maps 2 and 3). This road, however, is not plowed in winter, and travelers should always check with the Questa Ranger District Station before planning a trip to this area.

Begin from the town of Costilla, New Mexico, near the Colorado border, approximately 44 miles (70.8 km) north of Taos, New Mexico. From State Route 3, take County Road 96 to the east. Pavement ends after 6 miles (9.6 km), but the well-graveled road continues to a point 17 miles (27.4 km) from Costilla, where it becomes Forest Road 1950. At mile 18.4 (29.6 km) take the right fork to Shuree and continue past the Clayton Pass corrals which are in a low saddle at mile 26.4 (42.5 km). Park at approximately mile 27.0 (43.4 km). Little Costilla Peak is reached on foot by traveling up Middle Ponil Creek about 3 miles (4.9 km), then ascending the east flank of the peak. The terrain is reasonably easily traversed.

An alternate route that is considerably longer on foot, yet easier to ride on horseback, is the Little Costilla Creek Trail. Follow the vehicle directions above to Forest Road 1950. At mile 21.4 (34.4 km) the Little Costilla Trail (formerly a logging road) turns off to the left (east). Park here and walk or ride approximately 8.0 miles (12.9 km) to about the 11,400 foot (3475 m) level at the western edge of the RNA. Ascend through the dense spruce forest to the open tundra atop Little Costilla Peak, elevation 12,584 feet (3835.6 m).

AREA BY COVER TYPES

The distribution of cover types was determined from field surveys conducted in the summer of 1986 and from interpretation of 1981 aerial photography. Table 1 outlines the estimated total areas of vegetation types based on the Society of American Foresters forest type system (Eyre 1980) and the Küchler Potential Natural Vegetation system (Küchler 1966). Map 4 depicts the distribution of the SAF types, plus a tundra type not covered in the SAF forest categories, on the candidate research natural area.

Table 1. Estimated Areas of Vegetation Types in the Little Costilla Peak Research Natural Area.

Type	Society of American Foresters Cover Type[1]	Küchler PNV Type[2]	Surface Area Acres	Hectares
Engelmann Spruce Subalpine Fir	SAF 206	K-20 Engelmann Spruce-Subalpine Fir	241	97.5
Bristlecone Pine	SAF 209	K-8 Bristlecone Pine	138	55.9
Alpine Tundra	[none]	K-45 Alpine Meadows	271	109.6
		TOTAL:	650	263.0

[1]Eyre 1980.
[2]Küchler 1966.

PHYSICAL AND CLIMATIC CONDITIONS

Areas of this elevational range in northern New Mexico are generally classified as subhumid to humid in climate, and receive the greatest annual precipitation in the state. Average annual rainfall for Little Costilla Peak is 33 inches (838 mm), and average annual snowfall 79 inches (200.7 cm). Precipitation in the mountains comes in all seasons to a greater extent than it does in the arid and semiarid climates of New Mexico. Warm season rainfall (May to October), frequently from local orographic or convectional storms, accounts for 61% of the annual cycle of precipitation, with 39% falling as snow from cyclonic storms between November and April. Summer thunderstorms are more frequent in the peaks where the mountain slopes help trigger vertical movement in moist air that is already unstable, but greatest amount of precipitation per storm event is actually higher towards the bases of mountains. Mean annual temperature is a cool 28° F (-2.2° C), with a July high average of 54° F (12.2° C) and a January low of 16° F (-8.9° C). Climatic data was compiled from Southwestern Region Terresterial Ecoystem Survey information.

On Little Costilla Peak, closely juxtaposed variability in exposure to sun, prevailing wind direction, and degree of slope is responsible for sharp demarcations in vegetation types on

adjacent slopes. The steep (70°) and narrow north side has little plant community development. Though slope is far more gradual (15°) on the south side, heavy exposure to wind allows little snow accumulation. The low moisture supply here is further depleted by strong summer insolation, with the result that floral diversity is low, and about 40% of cover is lichens. Active talus is a factor in the development of a Kobresia turf on the west side.

DESCRIPTION OF VALUES

Flora

A broad survey of habitat types (HT) based upon DeVelice et al. (1986) was conducted during the field work. A brief review follows. For a more detailed description of the vegetative makeup of these types, see DeVelice et al. (1986).

About 60 per cent of the RNA consists of above timber line alpine tundra vegetation, from about 11,800 feet (3597 m) elevation to the summit of Little Costilla Peak at 12,584 feet (3836 m). A turf of Kobresia bellardi occurs on the lower third of this tundra on the west side of the peak. Above are found essentially fellfield plant communities with a high coverage of lichens. Cushion plants include Arenaria obtusiloba, Eritrichium nanum var. elongatum, Paronychia pulvinata, Silene acaulis, and Trifolium nanum. Sedges (Carex sp.) and bluegrass (Poa sp.) grow throughout the tundra.

The best examples of krummholz are found on the east side of the peak where dwarf Engelmann spruce (Picea engelmannii) and bristlecone pine (Pinus aristata) occur. Below the tundra on the west side of the peak is a narrow band of bristlecone pine/Thurber fescue Habitat Type (PIAR/FETH HT), where Picea engelmannii and Pinus aristata codominate the overstory.

Below this zone on the steep, predominantly west-facing slopes is a closed timberline spruce-fir forest, composed almost entirely of Picea engelmannii with occasional Abies lasiocarpa. Within this forest are mosaics of habitat types including Engelmann spruce/myrtle blueberry/Jacob's ladder (PIEN/VAMY/POPU HT), subalpine fir/moss (ABLA/MOSS HT), and subalpine fir/myrtle blueberry (ABLA/VAMY HT).

There are no known Endangered, Threatened, or Sensitive plant species in the proposed RNA.

The following plant list was compiled from field observations by Reggie Fletcher, USFS Southwestern Region Botanist, on July 29, 1982.

Abbreviated Plant List for Little Costilla Peak RNA

Latin Name	Common Name[1]	Location[2]
GRASSES AND GRASS-LIKE PLANTS:		

Agropyron scriberni	Spreading wheatgrass		W	
Agrostis variabilis	Wheatgrass		W	
Calamagrostis purpurascens	Reedgrass	E		S
Carex bella	Beautiful sedge		W	
Carex ebenea	Ebony sedge	E		
Carex festivella	Ovalhead sedge	E		
Carex rupestris var. drummondiana	Sedge		W	S
Festuca ovina var. ovina	Sheep fescue	E		
Festuca ovina var. brachyphylla	Alpine fescue	E	W	S
Festuca thurberi	Thurber fescue	E		
Juncus drummondii	Rush	E		
Kobresia bellardi	Kobresia	E	W	S
Luzula spicata	Woodrush	E	W	
Phleum alpinum	Alpine timothy	E		
Poa arctica	Arctic bluegrass	E		
Poa canbyi	Bluegrass	E	W	
Poa glauca	Bluegrass	E	W	
Poa interior	Inland bluegrass		W	
Poa nervosa	Wheeler bluegrass	E		
Poa rupicola	Timberline bluegrass	E	W	S
Poa rupicola x Poa alpina [possibly]		E		
Trisetum spicatum	Spike trisetum	E	W	

FORBS:

Achillea lanulosa ssp. alpicola	Western yarrow	E		
Agoseris aurantiaca	Orange agoseris	E		
Androsace carinata	Rockjasmine	E	W	S
Androsace septentrionalis var. puberulenta	Rockjasmine	E	W	
Antennaria rosea	Rose pussytoes	E		
Antennaria umbrinella	Pussytoes	E		
Arenaria fendleri var. tweedi	Fendler sandwort	E	W	S
Arenaria obtusiloba	Sandwort	E	W	S
Arenaria rubella	Sandwort	E		S
Artemisia pattersonii	Sagebrush		W	S
Artemisia scopulorum	Sagebrush		W	
Besseya oblongifolia	Kittentails		W	
Campanula rotundifolia	Bluebell	E		
Campanula uniflora	Bellflower	E		
Carea albonigra	Carea	E		
Castilleja haydenii	Paintbrush	E	W	S
Cerastium arvense	Starry mouse-ear	E		
Cerastium beeringianum	Alpine mouse-ear		W	
Claytonia megarrhiza	Springbeauty		W	
Delphinium alpestre	Alpine larkspur	E	W	
Draba aurea var. leiocarpa	Golden draba	E	W	S
Draba lanceolata	Whitlowwort		W	
Erigeron pinnatisectus	Fleabane	E		

Erigeron simplex	Fleabane	E	W	
Eritrichium nanum var. elongatum	Alpine forget-me-not			S
Geum turbinatum	Avens	E	W	S
Haplopappus pygmaeus	Alpine goldenweed	E	W	S
Heuchera parvifolia var. nivalis	Alumroot	E		
Hymenoxys acaulis var. caespitosa	Nostem rubbertweed	E		S
Hymenoxys grandiflora	Rubberweed	E	W	S
Mertensia alpina	Alpine bluebells	E	W	
Oreoxis bakeri	Oreoxis	E	W	S
Paronychia pulvinata	Nailwort	E		S
Penstemon whippleanus	Whipple penstemon	E		
Phlox variablis	Phlox		W	
Polemonium viscosum	Sticky Jacobsladder		W	
Polygonum bistortes	Bistort	E		
Polygonum viviparum	Alpine bistort		W	S
Potentilla cocinna	Elegant cinquefoil	E		
Potentilla rubricaulis	Cinquefoil		W	
Saxifraga bronchialis	Spotted saxifrage	E	W	
Saxifraga cernua	Nodding saxifrage		W	
Saxifraga flagellaris	Saxifrage		W	
Saxifraga rhomboidea	Saxifrage	E	W	
Sedum integrifolium	Stonecrop	E	W	
Sedum lanceolatum	Stonecrop	E	W	
Senecio crassulus	Groundsel	E	W	
Senecio taraxacoides	Dandelion butterweed		W	
Sibbaldia procumbens	Sibbaldia	E		
Silene acaulis	Moss silene		W	S
Silene scouleri ssp. pringlei	Scours catchfly	E	W	
Solidago multiradiata	Alpine goldenrod	E		
Taraxacum lyratum	Dandelion	E		
Trifolium brandegei	Brandegee alpine-clover	E	W	
Trifolium nanum	Dwarf alpine-clover	E	W	S
Woodsia oregana	Woodfern	E	W	

HALF-SHRUBS, SHRUBS, AND TREES:

Juniperus communis	Common juniper	E
Picea engelmannii	Engelmann spruce	E
Pinus aristata	Bristlecone pine	E
Potentilla fruticosa	Shrubby cinquefoil	E
Vaccinium scoparium	Grouse whortleberry	E

[1]Common names follow USDA, Forest Service 1974.

[2]Locations include:
E = East side [krummholtz of bristlecone pine and Engelmann spruce]
W = West side [kobresia turf overlying hummocked talus on lower 1/3; loose talus above]
S = South side [windswept rock and soil]

Fauna

No rare, threatened, or sensitive animal species are known to inhabit this area. This alpine tundra provides important summer habitat for elk. In the early 1980s, bighorn sheep were observed on Little Costilla Peak; they are not known to occur here in 1986, however.

The following animal list was derived from the RUN WILD III computer-stored data base (Lehmkuhl and Patton 1982; Patton 1979) from the following habitat types, for Colfax and Taos counties, New Mexico:

1. alpine tundra biome; Carex association
2. subalpine conifer forest biome; spruce-subalpine fir series

These habitat types currently in the data base most closely correspond to those occurring in the proposed RNA. The following species are potentially present:

Abbreviated Animal List for Little Costilla Peak R.N.A.

Common Name	Latin Name
BIRDS:	
Bluebird, mountain	Sialia currucoides
Chickadee, mountain	Parus gambeli
Creeper, brown	Certhia americana
Crossbill, red	Loxia curvirostra
Eagle, golden	Aquila chrysaetos
Finch, Cassin's	Carpodacus cassinii
Finch, rosy	Leucosticte arctoa
Flicker, northern	Colaptes auratus
Flycatcher, western	Empidonax difficilis
Goshawk, northern	Accipiter gentilis
Grouse, blue	Dendragapus obscurus
Hummingbird, broad-tailed	Selasphorus platycercus
Jay, Steller's	Cyanocitta stelleri
Junco, dark-eyed	Junco hyemalis
Kestrel, American	Falco sparverius
Kinglet, ruby-crowned	Regulus calendula
Lark, horned	Eremophila alpestris
Nutcracker, Clark's	Nucifraga columbiana
Nuthatch, pygmy	Sitta pygmaea
Nuthatch, red-breasted	Sitta canadensis
Owl, great-horned	Bubo virginianus
Pipit, water	Anthus spinoletta
Raven, common	Corvus corax
Robin, American	Turdus migratorius
Sapsucker, Williamson's	Sphyrapicus thyroideus
Siskin, pine	Carduelis pinus
Solitaire, Townsend's	Myadestes townsendi
Sparrow. Lincoln's	Melospiza lincolnii
Sparrow, white-crowned	Zonotrichia leucophrys

Swallow, violet-green	Tachycineta thalassina
Tanager, western	Piranga ludoviciana
Thrush, hermit	Catharus guttatus
Vireo, solitary	Vireo solitarius
Vulture, turkey	Cathartes aura
Waxwing, cedar	Bombycilla cedrorum
Woodpecker, three-toed	Picoides tridactylus
Wren, rock	Salpinctes obsoletus

MAMMALS:

Bobcat	Felis rufus
Chipmunk, Colorado	Tamias quadrivittatus
Coyote	Canis latrans
Deer, mule	Odocoileus hemionus
Elk	Cervus elaphus
Ermine	Mustela erminea
Gopher, northern pocket	Thomomys talpoides
Lion, mountain	Felis concolor
Marmot, yellow-bellied	Marmota flaviventris
Mouse, deer	Peromyscus maniculatus
Pika	Ochotona princeps
Shrew, vagrant	Sorex vagrans
Squirrel, golden-mantled ground	Spermophilus lateralis
Squirrel, red	Tamiasciurus hudsonicus
Vole, long-tailed	Microtus longicaudus
Weasel, long-tailed	Mustela frenata

Geology

The Cimarron Range extends to the southeast as a spur of the Sangre de Cristo Mountains, and is bordered on the west by the down-faulted Moreno Valley, on the east by the Raton Basin, and on the south by the lava-covered Ocate Plateau. Elevations range from 7500′ (2290 m) to 12,500′ (3810 m). The Cimarron Range is a north-plunging anticlinal mountain mass on which sedimentary rocks dip eastward off a pre-Cambrian core (Goodknight 1976:137). North of Cimarron Canyon, a thick stack of mid-Tertiary igneous sills, dividing Paleozoic and Mesozoic sedimentary rocks, makes up the bulk of the range.

The east side of the peak is characterized by Jurassic and Triassic rocks undivided, including red, gray, and brown shale and sandstone; light-gray cross-bedded dune sandstone, and lensing limestone conglomerate. The Sangre de Cristo formation is dominant on the northwest quarter, with maroon to brownish-red, arkosic conglomerate; motley or brown, red and variegated sandstone; thin, modular non-arkosic limestone; siltstone and shale. The southwest quarter is distinguished primarily by Precambrian granite that is massive, pink to pinkish-orange, and porphyritic.

Soils

The thin soils of the Sangre de Cristo range, derived from granite and scraped over by glaciers, are less retentive of water than soils in some other New Mexican mountains. The major association present in the proposed RNA is Rock outcrop-Penitente complex (Hacker and Carleton 1982). The cobbly loam Penitente soil is found in widely scattered pockets surrounded by areas of rock outcrop. This soil is deep and well-drained, and formed in colluvium and residuum of acid igneous or metamorhpic rock. Typically, the surface layer is dark brown cobbly sandy loam about 10 inches (25.4 cm) thick. The subsoil is brown very cobbly sandy loam about 14 inches (35.6 cm) thick. The substratum, a brown very cobbly loam, and rooting depth extend to about 60 inches (152.4 cm). Soils are also classified as Pergelic Cryumbrepts, loamy-skeletal, mixed.

Lands

All the land encompassed in the proposed RNA was donated to the people of the United States, to be administered by the National Forest Service, by the Vermejo Park Corporation on December 30, 1981, under authority of the Donation Acts of 1974 and 1978. Kaiser Steel retains a vested interest in coal in the eastern, Colfax county portion of the RNA. There are no known rights-of-way within the proposed boundaries.

Cultural

A cursory cultural resource survey was performed in the immediate and adjacent area of the RNA. Several small (less than 0.01 acres) shallow mineral prospect pits and an old range fence were located. No prehistoric cultural resources were found. There may be isolated lithic scatters in the area, but it is doubtful that any cultural sites will be found in the RNA, due to the high elevation. Upon establishment as an RNA, the area will be withdrawn from any archeological research that would in any way modify the existing site. Withdrawal of this area from archeological research would not significantly affect the data base as very few and only ephemeral prehistoric occupations are expected to have taken place here.

IMPACTS AND POSSIBLE CONFLICTS

Mineral Resources

The proposed RNA is within an area that Chevron Corporation wished to prospect for leasable minerals. Chevron withdrew their lease application in 1986. The coal rights in the eastern, Colfax county portion of the area are owned by Kaiser Industries. There is, however, little likelihood of coal reserves in this area, based on a study by the National Park Service in 1979.

Grazing

Livestock use is minimal due to steep slopes and the remoteness of the area, though the western half of the RNA is included within the Valle Vidal Allotment.

Timber

This area has about 290 acres (117.4 hectares) of spruce-fir which will be withdrawn from the timber base. Along the western boundary are two apparent inclusions (16 acres or 6.5 hectares, and 30 acres or 12.1 hectares) of old clear cuts.

Total forested: approximately 290 acres (117.4 hectares)
Commercial forest: approximately 290 acres (117.4 hectares)

Watershed Values

This peak is the head waters of three fifth code watersheds: the Costilla, Upper Vermejo, and Ponil. The western portion drains into Costilla Creek, and eventually into the Rio Grande 28 miles from the RNA. The Ponil watershed drains into the Cimarron River 32 miles from the area. The Upper Vermejo watershed feeds into the Vermejo River. Both the Cimarron and the Vermejo Rivers feed into the Canadian River.

Recreation Values

Recreation use in this area is light, but is expected to increase as the Valle Vidal Unit becomes more well known. There are no established hiking trails within the proposed RNA, but the high peak will attract visitors. The Little Costilla hiking trail, adjacent to the RNA, leads hikers up Little Costilla Creek to timber line and then down Powderhouse Canyon. Big game hunting, wildlife viewing, and nature study occur within the area. The western portion (Taos County) of the area is available for non-motorized winter recreation use, including cross- country skiing and snowshoeing. This area is closed to recreation use from May 1 to June 30 (and the eastern portion, Colfax County, from January 1 to March 31) for wildlife habitat protection.

Wildlife and Plant Values

The Little Costilla Peak area provides habitat for bighorn sheep. There may be potential to reintroduce bighorn sheep at sometime in the future. No threatened, endangered, or sensitive plant or animal species are known to occur in the area.

Wilderness, Wild and Scenic River, National Recreation Area Values

None of the above congressionally designated areas have been proposed for the Little Costilla Peak RNA or vicinity.

Transportation Plans

There is approximately 0.5 mile (0.8 km) of existing non-system roads associated with the old clear cuts.

Utility Corridor Plans

No existing or potential utility corridor plans exist in the vicinity of this RNA.

MANAGEMENT PLAN

The Carson National Forest Plan prescribes that there will be no harvest of timber or firewood and no assigned grazing capacity on Research Natural Areas. The prescriptions also prohibit off-road vehicle travel, open campfires, the introduction of non-native plant or animal species, road or trail construction, and recreational use if degradation results. However, non-motorized dispersed recreation activities are permitted provided they do not significantly modify the area, or threaten or impair the research or educational value of the area.

Vegetation Management

The Forest Plan provides that prescribed fire, using planned and unplanned ignitions, is allowed on the Little Costilla Peak RNA to maintain fire dependent ecosystems. A fire management plan for the RNA will be developed at a later time.

ADMINISTRATIVE RECORDS AND PROTECTION

Administration and protection of the Little Costilla Peak RNA will be the responsibility of the Carson National Forest. The District Ranger, Questa Ranger District, Questa NM has direct responsibility.

The Director of the Rocky Mountain Forest and Range Experiment Station, or his designee, will be responsible for any studies or research conducted in the area, and requests to conduct research in the area will be referred to him. He, or his designee, will evaluate research proposals and coordinate all studies and research in the area with the District Ranger. All plant and animal specimens collected in the course of research conducted in the area will be properly preserved and maintained within university or federal agency herbaria and museums, approved by the Rocky Mountain Station Director.

Records for the Little Costilla Peak RNA will be maintained in the following offices:

Regional Forester, Southwestern Region, Albuquerque, NM
Rocky Mountain Station, Fort Collins, CO
Carson National Forest, Taos, NM
District Ranger, Questa Ranger District, Questa, NM

REFERENCES

DeVelice, Robert L., John A. Ludwig, William H. Moir, and Frank Ronco, Jr. 1986. A classification of forest habitat types of northern New Mexico and southern Colorado. U.S.D.A. Forest Service General Technical Report RM-131, 59 pp. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.

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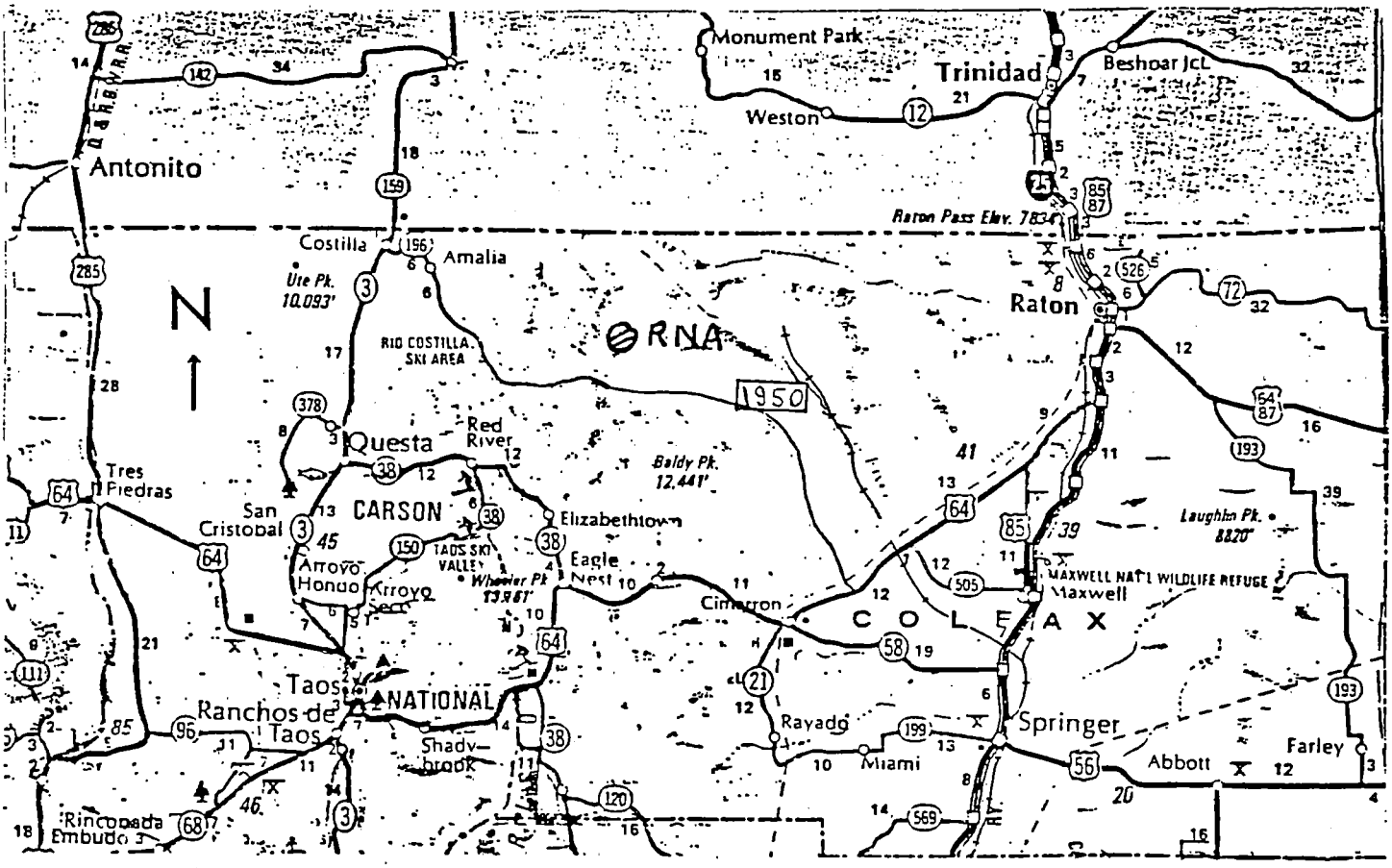
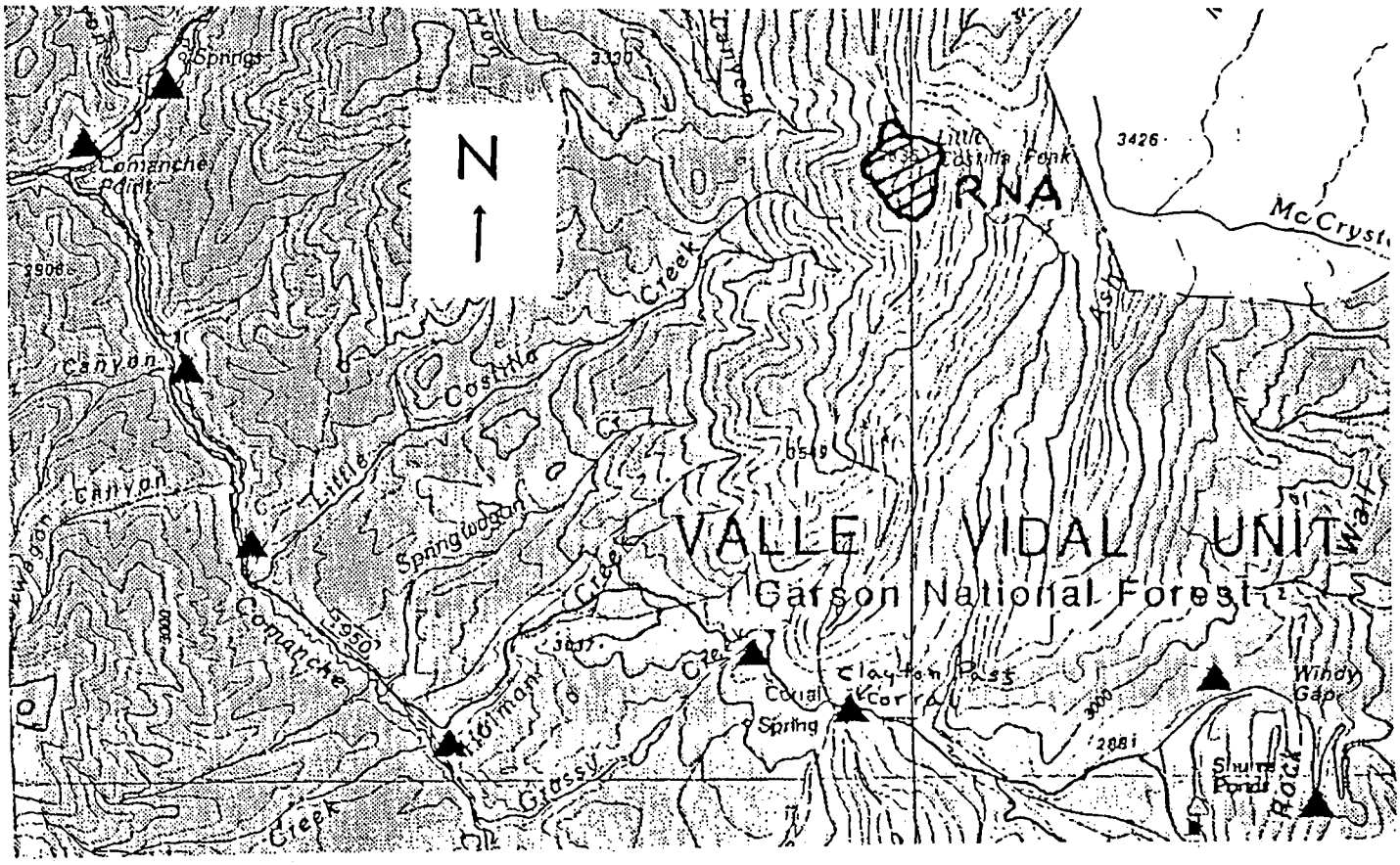
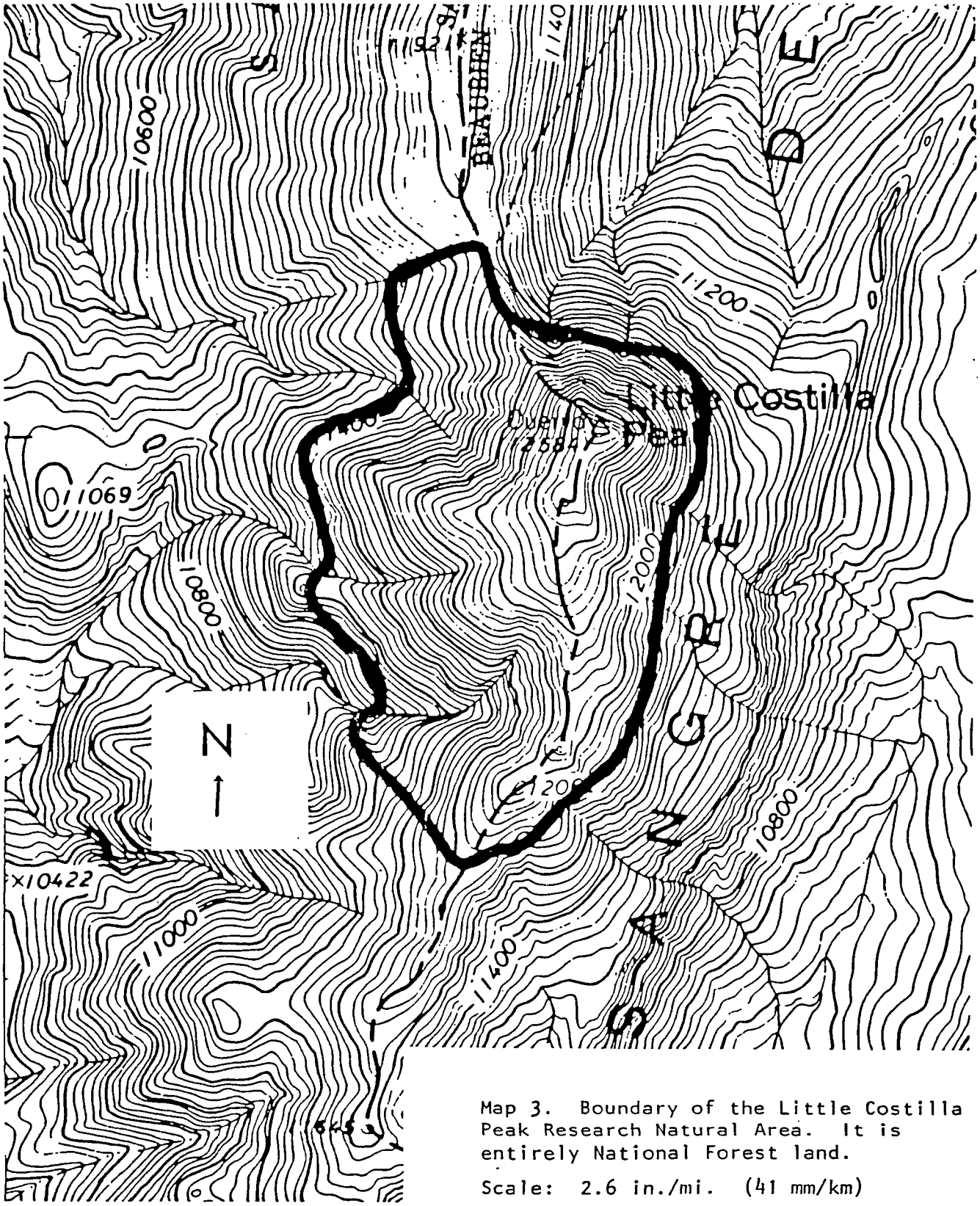


Map 1. Location of RNA (North Central New Mexico)



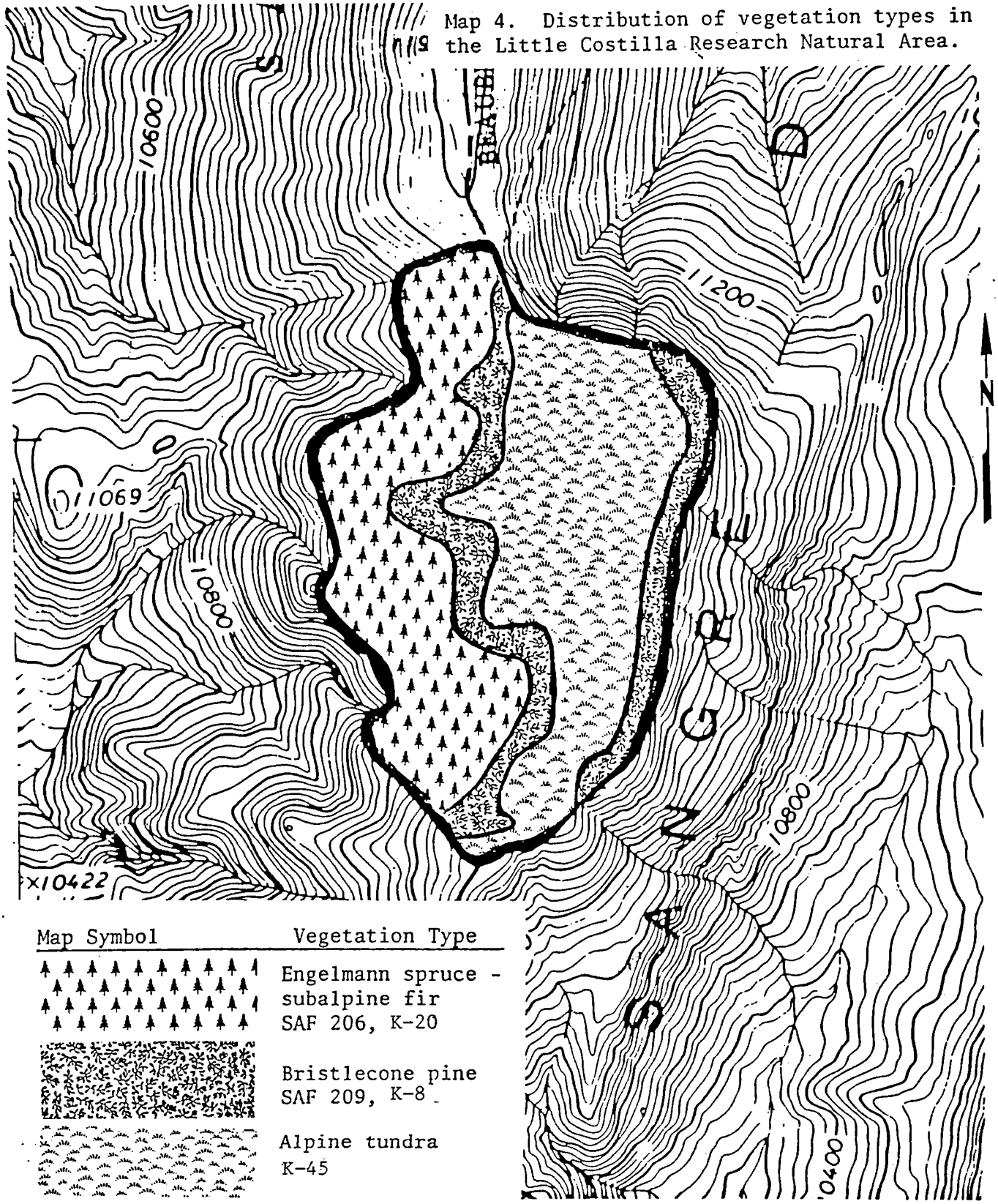
Map 2. Access Route to Little Costilla Peak RNA
Scale: 0.82 in./mi. (1.29 cm/km)



Map 3. Boundary of the Little Costilla Peak Research Natural Area. It is entirely National Forest land.

Scale: 2.6 in./mi. (41 mm/km)

Map 4. Distribution of vegetation types in the Little Costilla Research Natural Area.



Map Symbol	Vegetation Type
	Engelmann spruce - subalpine fir SAF 206, K-20
	Bristlecone pine SAF 209, K-8
	Alpine tundra K-45

Photo 1. West toward Little Costilla Peak from McCrystal Meadow showing east boundary of Little Costilla Peak RNA just above timber line.

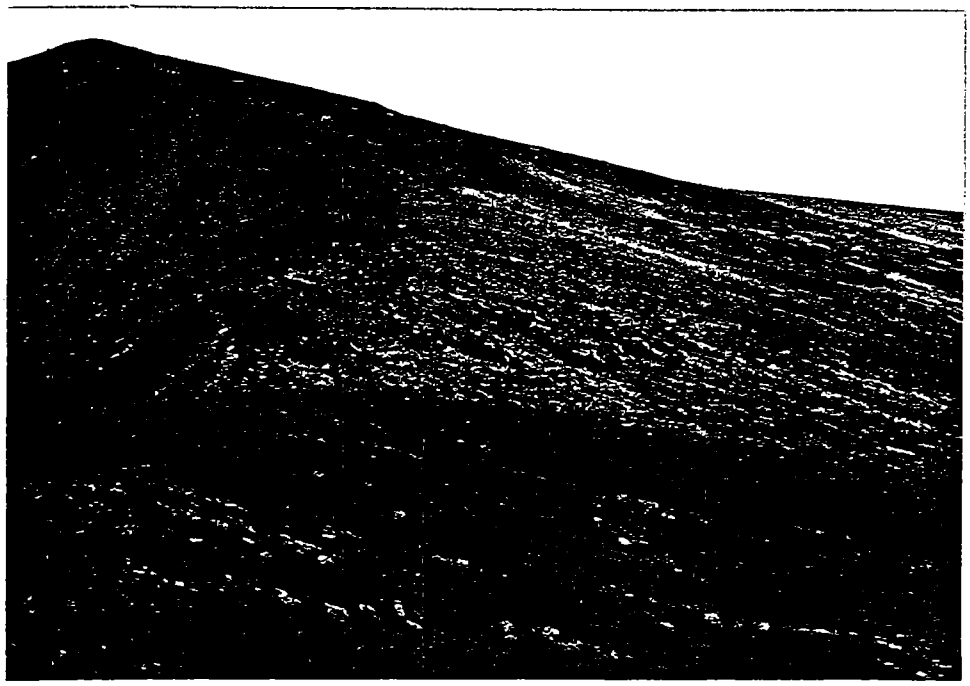


Photo 2. Cushion plant fellfield tundra on northwest side of Little Costilla Peak near summit.

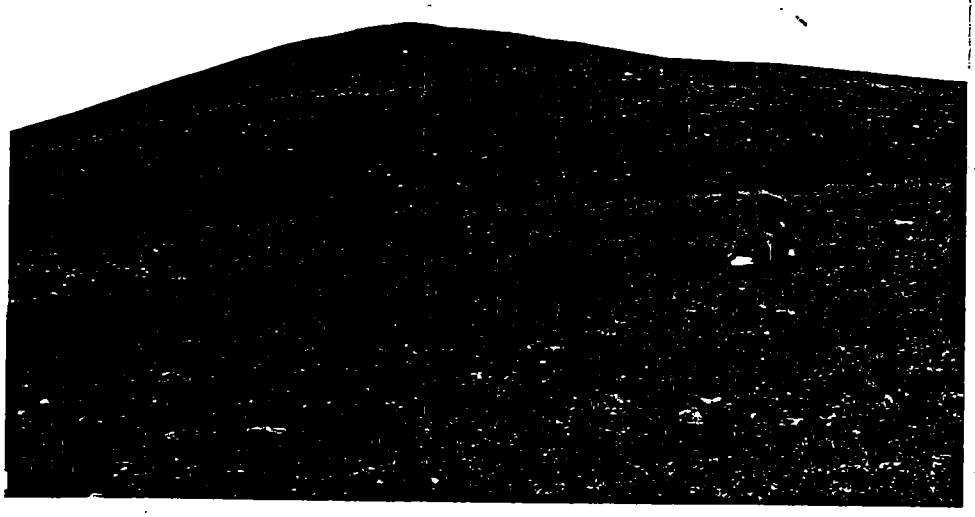


Photo 3. Kobresia bellardi cures to a golden hue in late summer on southwest slopes of Little Costilla Peak.

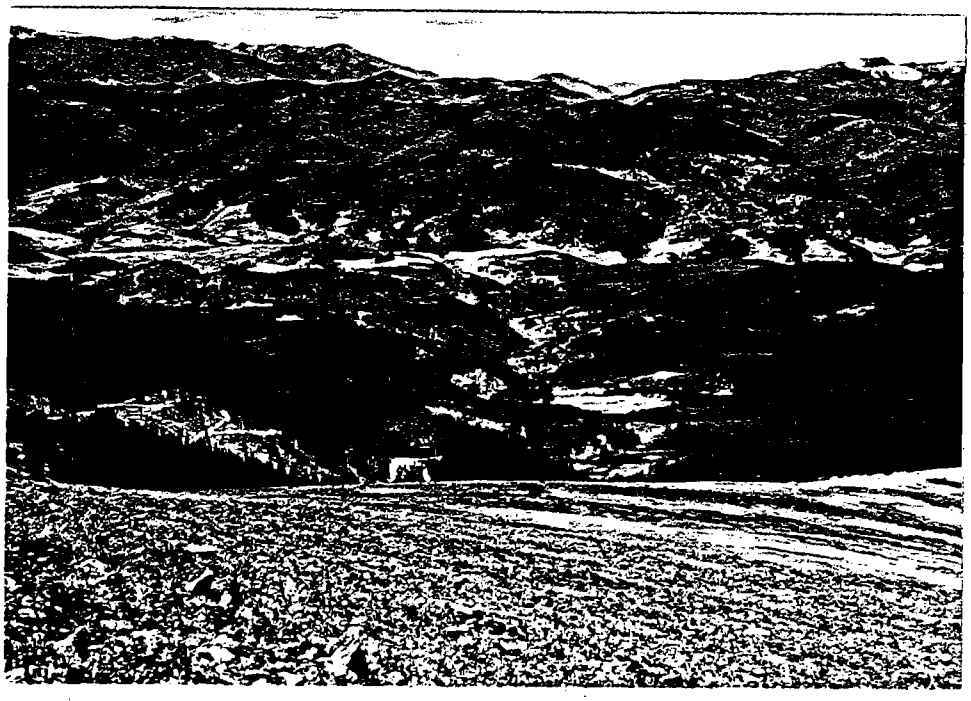


Photo 4. Little Costilla Peak RNA is an important summering ground for elk, a group of which are seen in the distance on the southwest slopes of the mountain. Logging area in the distance is outside the RNA.

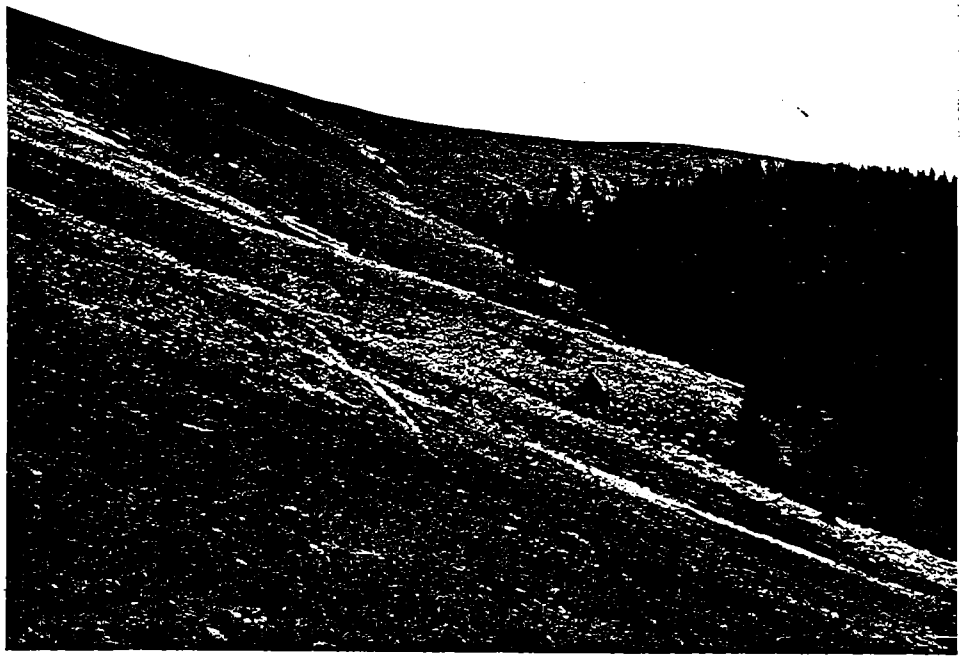


Photo 5. The demarcation line between the closed spruce-fir forest and the alpine tundra on the west flank of Little Costilla peak is sharp.

Photo 6. A narrow band of PIAR/FETH Habitat Type where Picea engelmannii and Pinus aristata codominate exists between the tundra and the closed spruce-fir forest below on the west-facing slopes of the mountain.

USDA-FOREST SERVICE

PHOTOGRAPHIC RECORD

(See FSM 1643.52)

PHOTOGRAPHER: William W. Dunmire

DATE SUBMITTED: 7/1/87

HEADQUARTERS UNIT:

LOCATION:

INITIAL DISTRIBUTION OF PRINTS AND FORM 1600-1:

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INSTRUCTIONS: Submit to Washington Office in quadruplicate. Permanent numbers will be assigned and the forms will be distributed as follows: (1) Washington Office, (2) RO or Station, (3) Forest or Center and (4) Photographer.

PHOTOGRAPH NUMBER TEMP. (1)	PHOTOGRAPH NUMBER PERMANENT (To be filled in by the WO) (2)	SELECTED FOR W.O. PHOTO LIBRARY (3)	DATE OF EXPOSURE (4)	LOCATION (State, Forest, District and County) (5)	CONCISE DESCRIPTION OF VIEW (6)	NEGATIVE (Show size and BW for black and white or C for color) (7)
				ALL: New Mexico Carson NF Questa Dist. Colfax Co.		ALL: 24x36mm color slides
1.			8-28-86		West toward Little Costilla Peak from McCrystal Meadow.	
2.			8-28-86		Little Costilla Peak summit from northwest ridge.	
3.			8-28-86		Kobresia tundra and alpine cushion plants on southwest slope of Little Costilla Peak.	
4.			7-08-86		Elk on southwest slope of Little Costilla Peak.	
5.			8-28-86		Edge of spruce-fir forest on west slope of Little Costilla Peak.	
6.			8-28-86		Picea engelmanii and Pinus aristata below tundra on west slope of Little Costilla Peak.	

not reviewed by me.
DLM

DESIGNATION ORDER

By virtue of the authority vested in me by the Secretary of Agriculture under regulations 7 CFR 2.42 and 36 CFR 251.23, I hereby establish the Little Costilla Peak Research Natural Area. The Little Costilla Peak Research Natural Area shall be comprised of the following land: The area is located roughly 25 miles (40.2 km) northeast of Questa, New Mexico, in the Ash Mountain USGS 15′ quadrangle (latitude 36°50′,longitude 105°13′), Township 30 N, Range 16 E, Sections 15, 16, 21, and 22 (Map 1). The boundary east of the high divide follows the 11,800 ft contour. From a point at 11,800 ft on the high divide south of Little Costilla Peak the west boundary descends in a northwest direction to the 11,400 ft contour and follows this contour to a point in a ravine northwest of Little Costilla Peak. The boundary then proceeds easterly up this ravine to the high divide at 11,640 ft and thence southerly along the high divide where it joins the boundary east of the high divide. Elevations within the RNA range from 11,400 ft (3470 m) to 12,584 ft (3840 m), and the area comprises approximately 650 acres (263 ha). The proposed RNA is an irregularly shaped area including all slope aspects of the peak from an elevation of approximately 11,800 feet (3596.7 m) to the summit. The peak is split along the north-south divide by the Taos-Colfax County line. The proposed RNA comprises approximately 650 acres (263.0 hectares).

Regional Forester, Sotero Muniz, recommended the establishment of the Little Costilla Peak Research Natural Area in the Carson National Forest Land and Resource Plan. That recommendation was the result of an analysis of the factors listed in 36 CFR 219.25 and Forest Service Manual 4063.41. The results of the Regional Forester's analysis are documented in the Final Environmental Impact Statement for the National Forest Land and Resource Management Plan and the Establishment Record which are available to the public.

The Little Costilla Peak Research Natural Area will be managed in compliance with all relevant laws, regulations, and manual direction regarding Research Natural Areas. The Little Costilla Peak Research Natural Area will be administered in accordance with the management direction identified in the Establishment Record.
The Carson National Forest Land and Resource Management Plan is hereby amended to be consistent with the management direction identified in the Establishment Record and this designation order. Directions on page 230 of the Carson National Forest Land and Resource Management Plan are replaced by the directions on page 12 of the Establishment Record. This direction will remain in effect unless amended pursuant to 36 CFR 219.10. This is a nonsignificant amendment of the Carson National Forest Land and Resource Management Plan.

The Forest Supervisor of the Carson National Forest shall notify the public of this amendment and will mail a copy of the Designation Order and amended direction to all persons on the Carson Land and Resource Management Plan mailing list.

Based on the environmental analysis documented in the National Forest Land and Resource Management Plan and the Establishment Record I find that the designation of the Little Costilla Peak Research Natural Area is not a major federal action significantly affecting the quality of the human environment.

This decision is subject to appeal pursuant to 36 CFR 211.18. A Notice of Appeal must be in writing and submitted to:

Chief
USDA, Forest Service
P.O. Box 96090
Washington, D.C. 20013-6090

The Notice of Appeal must be submitted within 45 days form the date of this decision. Within five days of receipt, the Chief will transmit the Notice of Appeal and a copy of the Designation order to the Secretary of Agriculture for review at the Secretary's discretion. The appeal will be deemed denied if the Secretary takes no action within ten days of receiving the appeal.

_____ _____

Chief Date

ESTABLISHMENT RECORD

for

LITTLE COSTILLA PEAK RESEARCH NATURAL AREA

within

Carson National Forest

Taos and Colfax Counties, New Mexico

INTRODUCTION

The Little Costilla Peak Research Natural Area (RNA) comprises approximately 650 acres (263.0 hectares) in the Sangre de Cristo Mountains of north-central New Mexico. The proposed RNA is located in the Questa Ranger District, Carson National Forest, in Taos and Colfax Counties, and is all acquired National Forest land.

Alpine tundra has been noted as an important high-elevation ecosystem for protection within the RNA program (USFS Regional Guide, 1983: Table 3-1). In July, 1982, a task group of the Regional RNA Committee investigated several candidate tundra areas proposed by the Carson National Forest. The Task Group concurred that Little Costilla Peak constituted the only real opportunity to provide suitable representation.

Land Management Planning

The need for representation of this biotic community was identified in the Southwestern Regional Guide (August 1983) although this particular site was not identified by name. The Carson National Forest Plan, implemented December 8, 1986, does not include the Valle Vidal portion of the Forest. The Little Costilla Peak, McCrystal Meadow, and Clayton Pass proposed Research Natural Areas are within the Valle Vidal. The Forest is presently working on an amendment to the Forest Plan to include the Valle Vidal. It is anticipated that the environmental analysis (or EIS) prepared for the amendment will support the establishment of the three proposed Research Natural Areas. In the meantime the areas are designated for protection in the Multiple Use Area Guide for the Valle Vidal which has been approved by the Regional Forester. The management of the Valle Vidal will be governed by the Multiple Use Area Guide until the Forest Plan is amended to include the Unit.

JUSTIFICATION STATEMENT FOR ESTABLISHMENT OF AREA

Little Costilla Peak Research Natural Area was identified primarily as an outstanding example of an alpine tundra ecosystem. This is an important high-elevation ecosystem in the Southwest. The need to include such an ecosystem within the RNA network of the Southwestern Region has been stated in the Regional Guide (USFS 1983).

Little Costilla Peak should be added to the RNA system as it provides a secluded discrete unit for alpine study. The entire alpine community here can be considered fellfield, one of several important communities in the alpine of New Mexico. The alpine in New Mexico is unique due to its geographic location at the southern tip of the Rocky Mountains. This allows rapid evolution of new taxonomic entities and provides an unparalleled opportunity for studies in plant systematics.

PRINCIPAL DISTINGUISHING FEATURES

Little Costilla Peak is a small isolated alpine island including all slope aspects from an elevational range of 11.400 feet (3474.7 m) to 12,584 feet (3835.6 m). Alpine conditions here are dry, windswept, and exposed. On the west side of the peak, a turf of Kobresia bellardi occupies the lower third of the alpine, with talus and loose gravel above. The gentle slopes on the windswept south side allow little snow accumulation and receive very high summer insolation. Here are found essentially fellfield plant communities with a high coverage of lichens. The best examples of krummholz are found on the east side of the peak, where dwarf Engelmann spruce (Picea engelmannii) and bristlecone pine (Pinus aristata) occur. On steep northwest-facing slopes from 11,400 feet (3474.7 m) to timberline is a tract of closed spruce-fir forest.

LOCATION (Carson National Forest)

Little Costilla Peak is in the Valle Vidal unit of the Questa Ranger District, Carson National Forest. The area is located roughly 25 miles (40.2 km) northeast of Questa, New Mexico, in the Ash Mountain USGS 15' quadrangle (latitude 36 50', longitude 105 13'), Township 30 N, Range 16 E, Section 15 (Map 1). The boundary east of the high divide follows the 11,800 ft contour. From a point at 11,800 ft on the high divide south of Little Costilla Peak the west boundary descends in a northwest direction to the 11,400 ft contour and follows this contour to a point in a ravine northwest of Little Costilla Peak. The boundary then proceeds easterly up this ravine to the high divide at 11,640 ft and thence southerly along the high divide where it joins the boundary east of the high divide. Elevations within the RNA range from 11,400 ft (3470 m) to 12,584 ft (3840 m), and the area comprises approximately 650 acres (263 ha).

There are two choices for access to this RNA, and both require may miles of non-motorized travel. The road to either access point is easily traveled in a passenger vehicle most of the year when the Forest Road 1950 to the Valle Vidal unit is open (Maps 2 and 3). This road, however, is not plowed in winter, and travelers should always check with the Questa Ranger District Station before planning a trip to this area.

Begin from the town of Costilla, New Mexico, near the Colorado border, approximately 44 miles (70.8 km) north of Taos, New Mexico. From State Route 3, take County Road 96 to the east. Pavement ends after 6 miles (9.6 km), but the well-graveled road continues to a point 17 miles (27.4 km) from Costilla, where it becomes Forest Road 1950. At mile 18.4 (29.6 km) take the right fork to Shuree and continue past the Clayton Pass corrals which are in a low saddle at mile 26.4 (42.5 km). Park at approximately mile 27.00 (43.4 km). Little Costilla Peak is reached on foot by traveling up Middle Ponil Creek about 3 miles (4.9 km), then ascending the east flank of the peak. The terrain is reasonably easily traversed.

An alternate route that is considerably longer on foot, yet easier to ride on horseback, is the Little Costilla Creek Trail. Follow the vehicle directions above to Forest Road 1950. At mile 21.4 (34.4 km) the Little Costilla Trail (formerly a logging road) turns off to the left (east). Park here and walk or ride approximately 8.0 miles (12.9 km) to about the 11,400 foot (3475 m) level at the western edge of the RNA. Ascend through the dense spruce forest to the open tundra atop Little Costilla Peak, elevation 12,584 feet (3835.6 m).

RNA. Ascend through the dense spruce forest to the open tundra atop Little Costilla Peak, elevation 12,584 feet (3835.6 m).

AREA BY COVER TYPES

The distribution of cover types was determined from field surveys conducted in the summer of 1986 and from interpretation of 1981 aerial photography. Table 1 outlines the estimated total areas of vegetation types based on the Society of American Foresters forest type system (Eyre 1980) and the Küchler Potential Natural Vegetation system (Küchler 1964). Map 4 depicts the distribution of the SAF types, plus a tundra type not covered in the SAF forest categories, on the candidate research natural area.

Table 1. Estimated Areas of Vegetation Types in the Little Costilla Peak Research Natural Area.

Type	Society of American Foresters Cover Type[1]	Küchler PNV Type[2]	Surface Area Acres	Hectares
Engelmann Spruce - Subalpine Fir	SAF 206	K-20 Southwestern Spruce - Fir	241	97.5
Bristlecone Pine	SAF 209	K-8 Great Basin Pine Forest	138	55.9
Alpine Tundra	[none]	K-45 Alpine Meadows	271	109.6
		TOTAL:	650	263.0

[1]Eyre 1980.
[2]Küchler 1964.

PHYSICAL AND CLIMATIC CONDITIONS

Areas of this elevational range in northern New Mexico are generally classified as subhumid to humid in climate, and receive the greatest annual precipitation in the state. Average annual rainfall for Little Costilla Peak is 33 inches (838 mm), and average annual snowfall 79 inches (200.7 cm). Precipitation in the mountains comes in all seasons to a greater extent than it does in the arid and semiarid climates of New Mexico. Warm season rainfall (May to October), frequently from local orographic or convectional storms, accounts for 61% of the annual cycle

of precipitation, with 39% falling as snow from cyclonic storms between November and April. Summer thunderstorms are more frequent in the peaks where the mountain slopes help trigger vertical movement in moist air that is already unstable, but greatest amount of precipitation per storm event is actually higher towards the bases of mountains. Mean annual temperature is a cool 28° F (-2.2° C), with a July high average of 54° F (12.2° C) and a January low of 16° F (-8.9° C).

On Little Costilla Peak, closely juxtaposed variability in exposure to sun, prevailing wind direction, and degree of slope is responsible for sharp demarcations in vegetation types on adjacent slopes. The steep (70°) and narrow north side has little plant community development. Though slope is far more gradual (15°) on the south side, heavy exposure to wind allows little snow accumulation. The low moisture supply here is further depleted by strong summer insolation, with the result that floral diversity is low, and about 40% of cover is lichens. Active talus is a factor in the development of a Kobresia turf on the west side.

DESCRIPTION OF VALUES

Flora

A broad survey of habitat types (HT) based upon DeVelice et al. (1986) was conducted during the field work. A brief review follows. For a more detailed description of the vegetative makeup of these types, see DeVelice et al. (1986).

About 60 per cent of the RNA consists of above timber line alpine tundra vegetation, from about 11,800 feet (3597 m) elevation to the summit of Little Costilla Peak at 12,584 feet (3836 m). A turf of Kobresia bellardi occurs on the lower third of this tundra on the west side of the peak. Above are found essentially fellfield plant communities with a high coverage of lichens. Cushion plants include Arenaria obtusiloba, Eritrichium nanum var. elongatum, Paronychia pulvinata, Silene acaulis, and Trifolium nanum. Sedges (Carex sp.) and bluegrass (Poa sp.) grow throughout the tundra.

The best examples of krummholz are found on the east side of the peak where dwarf Engelmann spruce (Picea engelmannii) and bristlecone pine (Pinus aristata) occur. Below the tundra on the west side of the peak is a narrow band of bristlecone pine/Thurber fescue Habitat Type (PIAR/FETH HT), where Picea engelmannii and Pinus aristata codominate the overstory.

Below this zone on the steep, predominantly west-facing slopes is a closed timberline spruce-fir forest, composed almost entirely of Picea engelmannii with occasional Abies lasiocarpa. Within this forest are mosaics of habitat types including Engelmann spruce/myrtle blueberry/Jacob's ladder (PIEN/VAMY/POPU HT), subalpine fir/moss (ABLA/MOSS HT), and subalpine fir/myrtle blueberry (ABLA/VAMY HT).

There are no known endangered, threatened, or unique plant species in the proposed RNA.

The following plant list was compiled from field observations by Reggie Fletcher, USFS Southwestern Region Botanist, on July 29, 1982.

Abbreviated Plant List for Little Costilla Peak RNA

Latin Name	Common Name[1]	Location[2]
GRASSES AND GRASS-LIKE PLANTS:		
Agropyron scriberni	Spreading wheatgrass	W
Agrostis variabilis	Wheatgrass	W
Calamagrostis purpurascens	Reedgrass	E S
Carex bella	Beautiful sedge	W
Carex ebenea	Ebony sedge	E
Carex festivella	Ovalhead sedge	E
Carex rupestris var. *drummondiana*	Sedge	W S
Festuca ovina var. *ovina*	Sheep fescue	E
Festuca ovina var. *brachyphylla*	Alpine fescue	E W S
Festuca thurberi	Thurber fescue	E
Juncus drummondii	Rush	E
Kobresia bellardi	Kobresia	E W S
Luzula spicata	Woodrush	E W
Phleum alpinum	Alpine timothy	E
Poa arctica	Arctic bluegrass	E
Poa canbyi	Bluegrass	E W
Poa glauca	Bluegrass	E W
Poa interior	Inland bluegrass	W
Poa nervosa	Wheeler bluegrass	E
Poa rupicola	Timberline bluegrass	E W S
Poa rupicola x *Poa alpina* [possibly]		E
Trisetum spicatum	Spike trisetum	E W
FORBS:		
Achillea lanulosa ssp. *alpicola*	Western yarrow	E
Agoseris aurantiaca	Orange agoseris	E
Androsace carinata	Rockjasmine	E W S
Androsace septentrionalis var. *puberulenta*	Rockjasmine	E W
Antennaria rosea	Rose pussytoes	E
Antennaria umbrinella	Pussytoes	E
Arenaria fendleri var. *tweedi*	Fendler sandwort	E W S
Arenaria obtusiloba	Sandwort	E W S
Arenaria rubella	Sandwort	E S
Artemisia pattersonii	Sagebrush	W S
Artemisia scopulorum	Sagebrush	W
Besseya oblongifolia	Kittentails	W
Campanula rotundifolia	Bluebell	E
Campanula uniflora	Bellflower	E
Carea albonigra	Carea	E
Castilleja haydenii	Paintbrush	E W S
Cerastium arvense	Starry mouse-ear	E

Cerastium beeringianum	Alpine mouse-ear		W	
Claytonia megarrhiza	Springbeauty		W	
Delphinium alpestre	Alpine larkspur	E	W	
Draba aurea var. leiocarpa	Golden draba	E	W	S
Draba lanceolata	Whitlowwort		W	
Erigeron pinnatisectus	Fleabane	E		
Erigeron simplex	Fleabane	E	W	
Eritrichium nanum var. elongatum	Alpine forget-me-not			S
Geum turbinatum	Avens	E	W	S
Haplopappus pygmaeus	Alpine goldenweed	E	W	S
Heuchera parvifolia var. nivalis	Alumroot	E		
Hymenoxys acaulis var. caespitosa	Nostem rubbertweed	E		S
Hymenoxys grandiflora	Rubberweed	E	W	S
Mertensia alpina	Alpine bluebells	E	W	
Oreoxis bakeri	Oreoxis	E	W	S
Paronychia pulvinata	Nailwort	E		S
Penstemon whippleanus	Whipple penstemon	E		
Phlox variablis	Phlox		W	
Polemonium viscosum	Sticky Jacobsladder		W	
Polygonum bistortes	Bistort	E		
Polygonum viviparum	Alpine bistort		W	S
Potentilla cocinna	Elegant cinquefoil	E		
Potentilla rubricaulis	Cinquefoil		W	
Saxifraga bronchialis	Spotted saxifrage	E	W	
Saxifraga cernua	Nodding saxifrage		W	
Saxifraga flagellaris	Saxifrage		W	
Saxifraga rhomboidea	Saxifrage	E	W	
Sedum integrifolium	Stonecrop	E	W	
Sedum lanceolatum	Stonecrop	E	W	
Senecio crassulus	Groundsel	E	W	
Senecio taraxacoides	Dandelion butterweed		W	
Sibbaldia procumbens	Sibbaldia	E		
Silene acaulis	Moss silene		W	S
Silene scouleri ssp. pringlei	Scours catchfly	E	W	
Solidago multiradiata	Alpine goldenrod	E		
Taraxacum lyratum	Dandelion	E		
Trifolium brandegei	Brandegee alpine-clover	E	W	
Trifolium nanum	Dwarf alpine-clover	E	W	S
Woodsia oregana	Woodfern	E	W	

HALF-SHRUBS, SHRUBS, AND TREES:

Juniperus communis	Common juniper	E
Picea engelmannii	Engelmann spruce	E
Pinus aristata	Bristlecone pine	E
Potentilla fruticosa	Shrubby cinquefoil	E
Vaccinium scoparium	Grouse whortleberry	E

[1]Common names follow USDA. Forest Service 1974.

[2]Locations include:
E = East side [krummholtz of bristlecone pine and Engelmann spruce]
W = West side [kobresia turf overlying hummocked talus on lower 1/3; loose talus above]
S = South side [windswept rock and soil]

Fauna

No rare, threatened, or sensitive animal species are known to inhabit this area. This alpine tundra provides important summer habitat for elk. In the early 1980s, bighorn sheep were observed on Little Costilla Peak; they are not known to occur here in 1986, however.

The following animal list was derived from the RUN WILD III computer-stored data base (Lehmkuhl and Patton 1982; Patton 1979) from the following habitat types, for Colfax and Taos counties, New Mexico:

1. alpine tundra biome; Carex association
2. subalpine conifer forest biome; spruce-subalpine fir series

These habitat types currently in the data base most closely correspond to those occurring in the proposed RNA. The following species are potentially present.

Abbreviated Animal List for Little Costilla Peak R.N.A.

Common Name	Latin Name
BIRDS:	
Bluebird, mountain	Sialia currucoides
Chickadee, mountain	Parus gambeli
Creeper, brown	Certhia americana
Crossbill, red	Loxia curvirostra
Eagle, golden	Aquila chrysaetos
Finch, Cassin's	Carpodacus cassinii
Finch, rosy	Leucosticte arctoa
Flicker, northern	Colaptes auratus
Flycatcher, western	Empidonax difficilis
Goshawk, northern	Accipiter gentilis
Grouse, blue	Dendragapus obscurus
Hummingbird, broad-tailed	Selasphorus platycercus
Jay, Steller's	Cyanocitta stelleri
Junco, dark-eyed	Junco hyemalis
Kestrel, American	Falco sparverius
Kinglet, ruby-crowned	Regulus calendula
Lark, horned	Eremophila alpestris
Nutcracker, Clark's	Nucifraga columbiana
Nuthatch, pygmy	Sitta pygmaea
Nuthatch, red-breasted	Sitta canadensis
Owl, great-horned	Bubo virginianus
Pipit, water	Anthus spinoletta
Raven, common	Corvus corax
Robin, American	Turdus migratorius
Sapsucker, Williamson's	Sphyrapicus thyroideus
Siskin, pine	Carduelis pinus
Solitaire, Townsend's	Myadestes townsendi
Sparrow, Lincoln's	Melospiza lincolnii
Sparrow, white-crowned	Zonotrichia leucophrys
Swallow, violet-green	Tachycineta thalassina
Tanager, western	Piranga ludoviciana
Thrush, hermit	Catharus guttatus
Vireo, solitary	Vireo solitarius
Vulture, turkey	Cathartes aura
Waxwing, cedar	Bombycilla cedrorum
Woodpecker, three-toed	Picoides tridactylus
Wren, rock	Salpinctes obsoletus
MAMMALS:	
Bobcat	Felis rufus
Chipmunk, Colorado	Tamias quadrivittatus
Coyote	Canis latrans
Deer, mule	Odocoileus hemionus
Elk	Cervus elaphus
Ermine	Mustela erminea

Gopher, northern pocket	*Thomomys talpoides*
Lion, mountain	*Felis concolor*
Marmot, yellow-bellied	*Marmota flaviventris*
Mouse, deer	*Peromyscus maniculatus*
Pika	*Ochotona princeps*
Shrew, vagrant	*Sorex vagrans*
Squirrel, golden-mantled ground	*Spermophilus lateralis*
Squirrel, red	*Tamiasciurus hudsonicus*
Vole, long-tailed	*Microtus longicaudus*
Weasel, long-tailed	*Mustela frenata*

Geology

The Cimarron Range extends to the southeast as a spur of the Sangre de Cristo Mountains, and is bordered on the west by the down-faulted Moreno Valley, on the east by the Raton Basin, and on the south by the lava-covered Ocate Plateau. Elevations range from 7500' (2290 m) to 12,500' (3810 m). The Cimarron Range is a north-plunging anticlinal mountain mass on which sedimentary rocks dip eastward off a pre-Cambrian core (Goodknight 1976:137). North of Cimarron Canyon, a thick stack of mid-Tertiary igneous sills, dividing Paleozoic and Mesozoic sedimentary rocks, makes up the bulk of the range.

The east side of the peak is characterized by Jurassic and Triassic rocks undivided, including red, gray, and brown shale and sandstone; light-gray cross-bedded dune sandstone, and lensing limestone conglomerate. The Sangre de Cristo formation is dominant on the northwest quarter, with maroon to brownish-red, arkosic conglomerate; motley or brown, red and variegated sandstone; thin, modular non-arkosic limestone; siltstone and shale. The southwest quarter is distinguished primarily by Precambrian granite that is massive, pink to pinkish-orange, and porphyritic.

Soils

The thin soils of the Sangre de Cristo range, derived from granite and scraped over by glaciers, are less retentive of water than soils in some other New Mexican mountains. The major association present in the proposed RNA is Rock outcrop-Penitente complex (Hacker and Carleton 1982). The cobbly loam Penitente soil is found in widely scattered pockets surrounded by areas of rock outcrop. This soil is deep and well-drained, and formed in colluvium and residuum of acid igneous or metamorhpic rock. Typically, the surface layer is dark brown cobbly sandy loam about 10 inches (25.4 cm) thick. The subsoil is brown very cobbly sandy loam about 14 inches (35.6 cm) thick. The substratum, a brown very cobbly loam, and rooting depth extend to about 60 inches (152.4 cm). Soils are also classified as Pergelic Cryumbrepts, loamy-skeletal, mixed.

Lands

All the land encompassed in the proposed RNA was donated to the people of the United States, to be administered by the National Forest Service, by the Vermejo Park Corporation on December 30, 1981, under authority of the Donation Acts of 1974 and 1978. Kaiser Steel retains a vested interest in coal in the eastern, Colfax county portion of the RNA. There are no known rights-of-way within the proposed boundaries.

Cultural

A cursory cultural resource survey was performed in the immediate and adjacent area of the RNA. Several small (less than 0.01 acres) shallow mineral prospect pits and an old range fence were located. No prehistoric cultural resources were found. There may be isolated lithic scatters in the area, but it is doubtful that any cultural sites will be found in the RNA, due to the high elevation. Upon establishment as an RNA, the area will be withdrawn from any archeological research that would in any way modify the existing site. Withdrawal of this area from

archeological research would not significantly affect the data base as very few and only ephemeral prehistoric occupations are expected to have taken place here.

IMPACTS AND POSSIBLE CONFLICTS

Mineral Resources

The proposed RNA is within an area that Chevron Corporation wished to prospect for leasable minerals. Chevron withdrew their lease application in 1986. The coal rights in the eastern, Colfax county portion of the area are owned by Kaiser Industries. There is, however, little likelihood of coal reserves in this area, based on a study by the National Park Service in 1979.

Grazing

Livestock use is minimal due to steep slopes and the remoteness of the area, though the western half of the RNA is included within the Valle Vidal Allotment. Fencing of the Little Costilla Peak RNA will be required if grazing continues to be allowed in the adjacent area.

Timber

This area has about 290 acres (117.4 hectares) of spruce-fir which will be withdrawn from the timber base. Along the western boundary are two apparent inclusions (16 acres or 6.5 hectares, and 30 acres or 12.1 hectares) of old clear cuts.

Total forested: approximately 290 acres (117.4 hectares)
Commercial forest: approximately 290 acres (117.4 hectares)

Watershed Values

This peak is the head waters of three fifth code watersheds: the Costilla, Upper Vermejo, and Ponil. The western portion drains into Costilla Creek, and eventually into the Rio Grande 28 miles from the RNA. The Ponil watershed drains into the Cimarron River 32 miles from the area. The Upper Vermejo watershed feeds into the Vermejo River. Both the Cimarron and the Vermejo Rivers feed into the Canadian River.

Recreation Values

Recreation use in this area is light, but is expected to increase as the Valle Vidal Unit becomes more well known. There are no established hiking trails within the proposed RNA, but the high peak will attract visitors. The Little Costilla hiking trail, adjacent to the RNA, leads hikers up Little Costilla Creek to timber line and then down Powderhouse Canyon. Big game hunting, wildlife viewing, and nature study occur within the area. The western portion (Taos County) of the area is available for non-motorized winter recreation use, including cross-country skiing and snowshoeing. This area is closed to recreation use from May 1 to June 30 (and the eastern portion, Colfax County, from January 1 to March 31) for wildlife habitat protection.

Wildlife and Plant Values

The Little Costilla Peak area provides habitat for bighorn sheep.

There may be potential to reintroduce bighorn sheep at sometime in the future. No threatened, endangered, or sensitive plant or animal species are known to occur in the area.

Wilderness, Wild and Scenic River, National Recreation Area Values

None of the above congressionally designated areas have been proposed for the Little Costilla Peak RNA or vicinity.

Transportation Plans

There is approximately 0.5 mile (0.8 km) of existing non-system roads associated with the old clear cuts.

Utility Corridor Plans

No existing or potential utility corridor plans exist in the vicinity of this RNA.

MANAGEMENT PLAN

The Carson National Forest Plan prescribes that there will be no harvest of timber or firewood and no assigned grazing capacity on Research Natural Areas. The prescriptions also prohibit off-road vehicle travel, open campfires, the introduction of non-native plant or animal species, road or trail construction, and recreational use if degradation results. However, non-motorized dispersed recreation activities are permitted provided they do not significantly modify the area, or threaten or impair the research or educational value of the area.

Vegetation Management

The Forest Plan provides that prescribed fire, using planned and unplanned ignitions, is allowed on the Little Costilla Peak RNA to maintain fire dependent ecosystems. A fire management plan for the RNA will be developed at a later time.

ADMINISTRATIVE RECORDS AND PROTECTION

Administration and protection of the Little Costilla Peak RNA will be the responsibility of the Carson National Forest. The District Ranger, Questa Ranger District, Questa NM has direct responsibility.

The Director of the Rocky Mountain Forest and Range Experiment Station, or his designee, will be responsible for any studies or research conducted in the area, and requests to conduct research in the area will be referred to him. He, or his designee, will evaluate research proposals and coordinate all studies and research in the area with the District Ranger. All plant and animal specimens collected in the course of research conducted in the area will be properly preserved and maintained within university or federal agency herbaria and museums, approved by the Rocky Mountain Station Director.

Records for the Little Costilla Peak RNA will be maintained in the following offices:

Regional Forester, Southwestern Region, Albuquerque, NM
Rocky Mountain Station, Fort Collins, CO
Carson National Forest, Taos, NM
District Ranger, Questa Ranger District, Questa, NM

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DeVelice, Robert L., John A. Ludwig, William H. Moir, and Frank Ronco, Jr. 1986. A classification of forest habitat types of northern New Mexico and southern Colorado. U.S.D.A. Forest Service General Technical Report RM-131, 59 pp. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.

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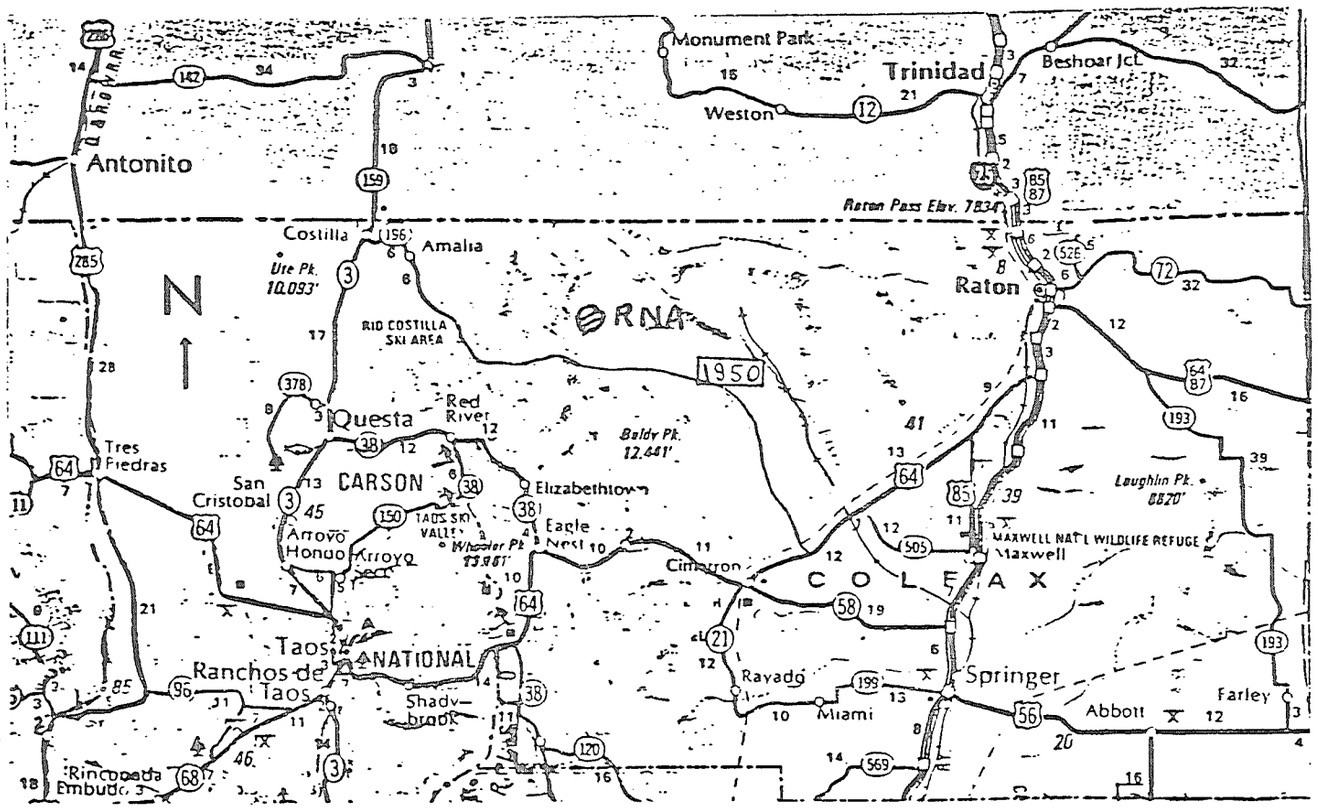
USDA Forest Service. 1986. Carson National Forest Plan. USDA Forest Service, Southwestern Region. Albuquerque.

DESIGNATION ORDER

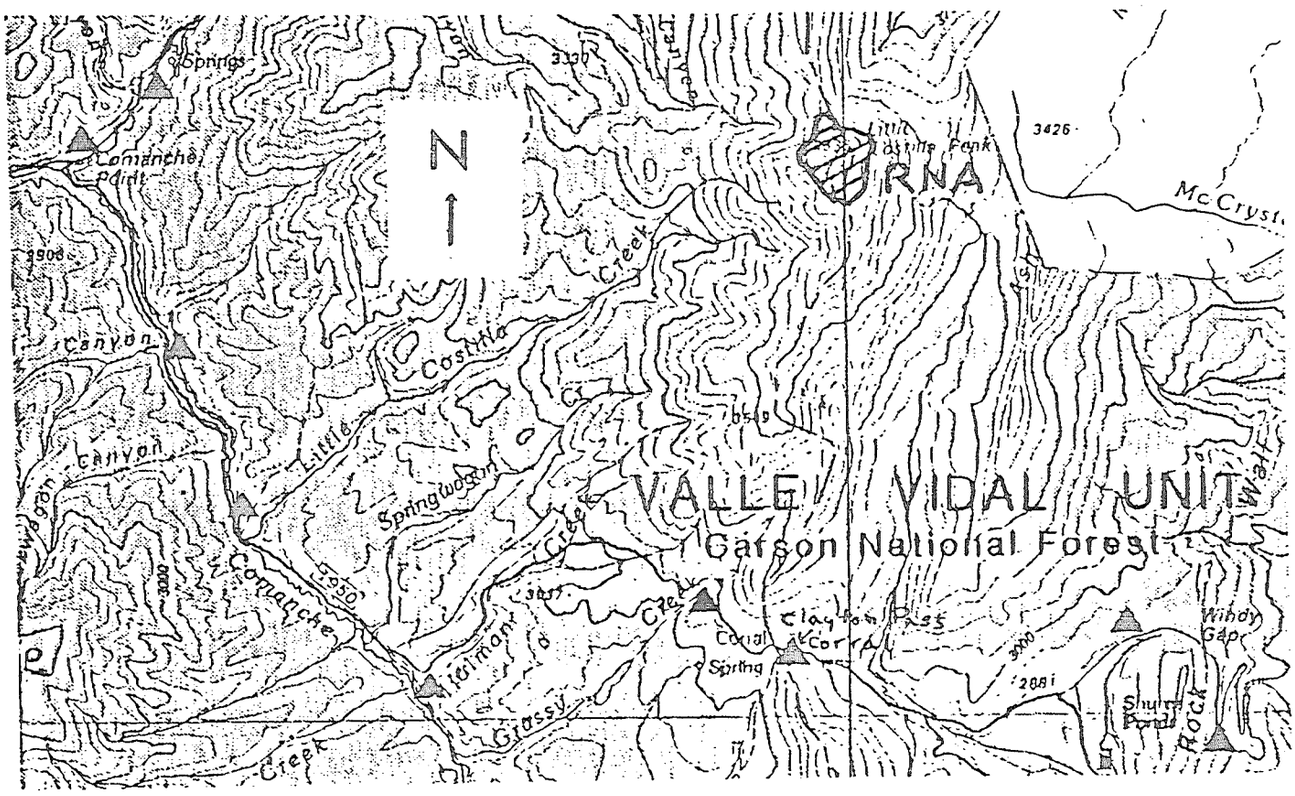
By virtue of the authority vested in me by the Secretary of Agriculture under regulations 7 CFR 2.60(a) and 36 CFR 251.23, I hereby designate as the Little Costilla Peak Research Natural Area the lands described in the following establishment record prepared by William W. Dunmire and Mollie S. Toll, dated July 1, 1987. These lands shall hereafter be administered as a research natural area subject to the above regulations and instructions issued thereunder.

_____ _____

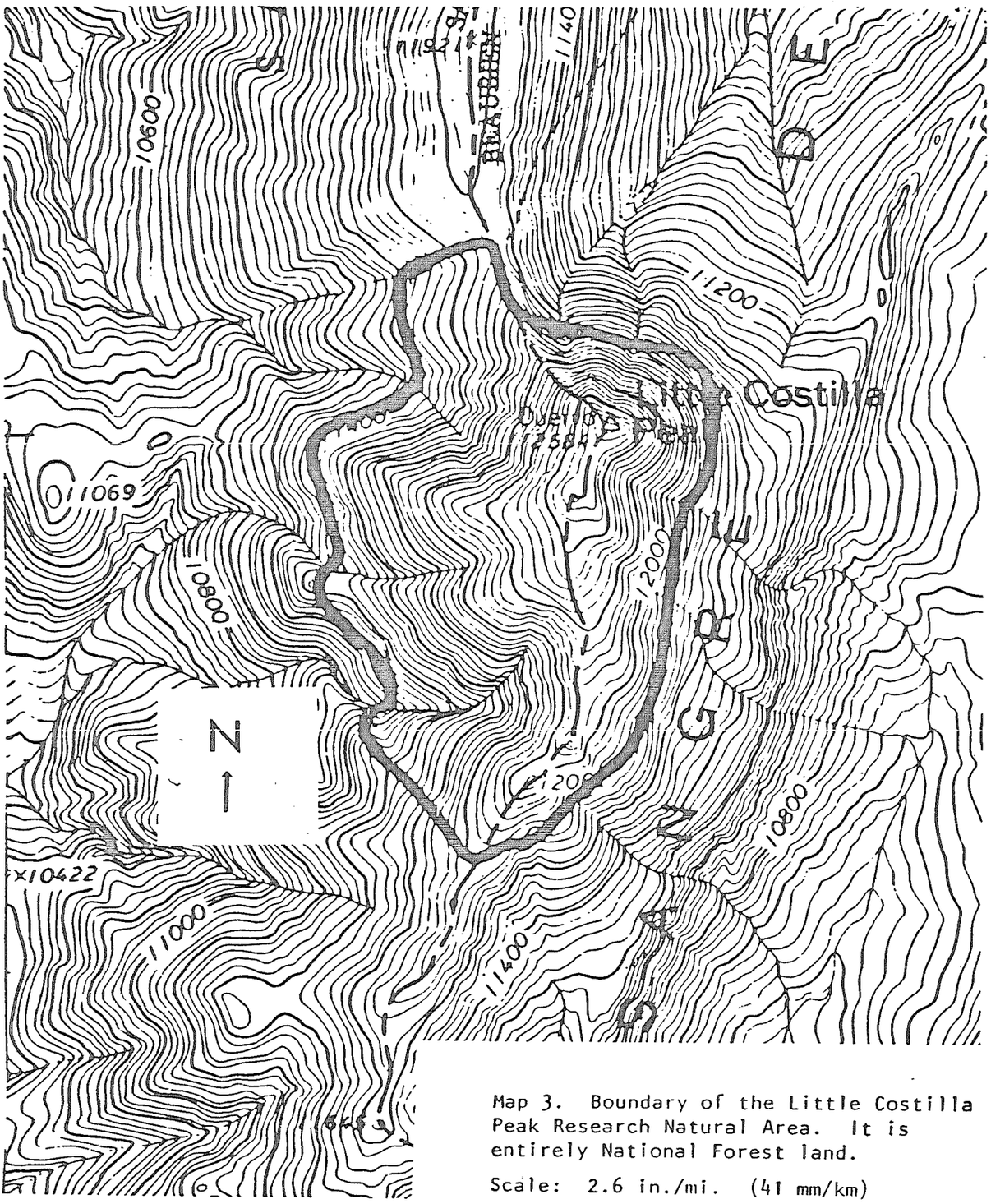
Chief Date



Map 1. Location of RNA (North Central New Mexico)



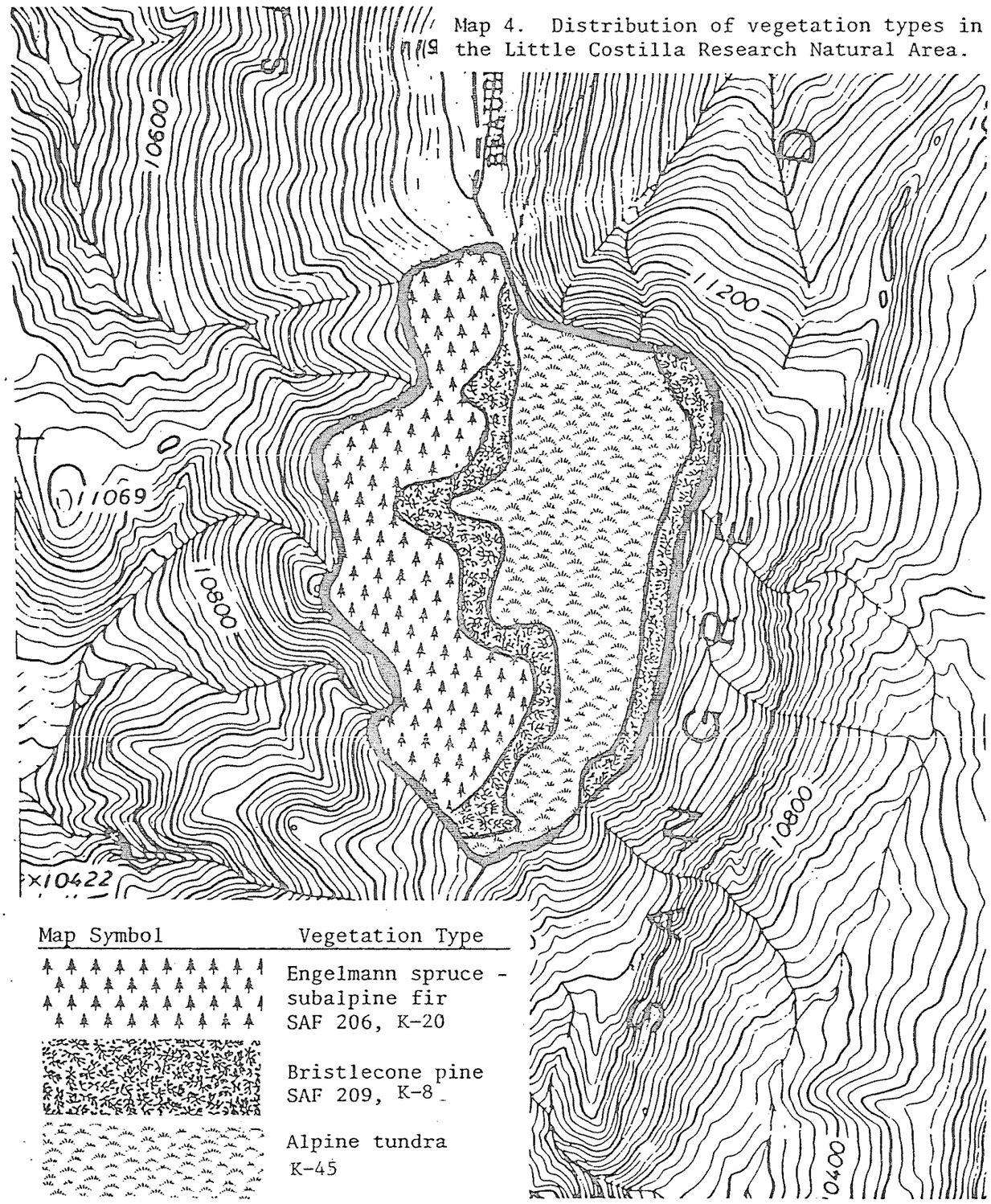
Map 2. Access Route to Little Costilla Peak RNA
Scale: 0.82 in./mi. (1.29 cm/km)



Map 3. Boundary of the Little Costilla Peak Research Natural Area. It is entirely National Forest land.

Scale: 2.6 in./mi. (41 mm/km)

Map 4. Distribution of vegetation types in the Little Costilla Research Natural Area.



Map Symbol	Vegetation Type
	Engelmann spruce - subalpine fir SAF 206, K-20
	Bristlecone pine SAF 209, K-8
	Alpine tundra K-45

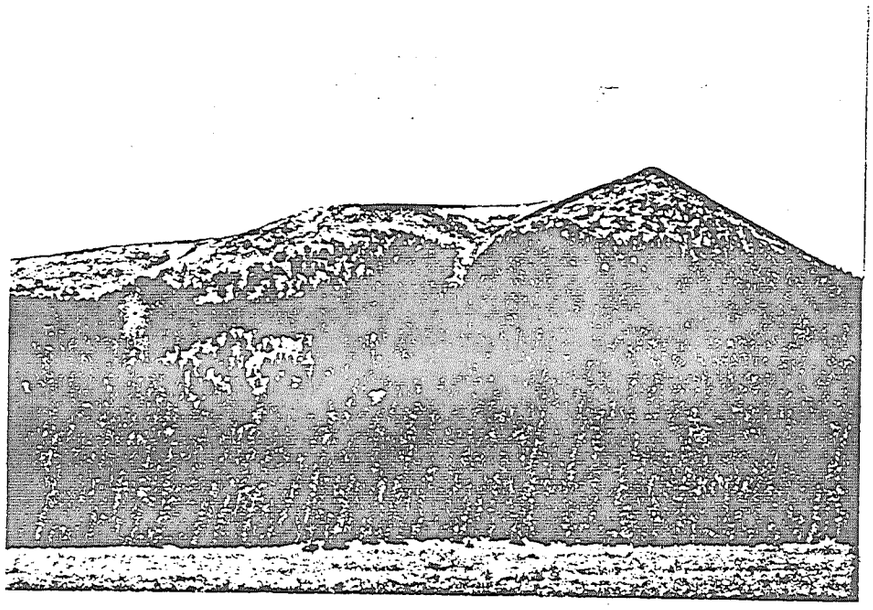


Photo 1. West toward Little Costilla Peak from McCrystal Meadow showing east boundary of Little Costilla Peak RNA just above timber line.

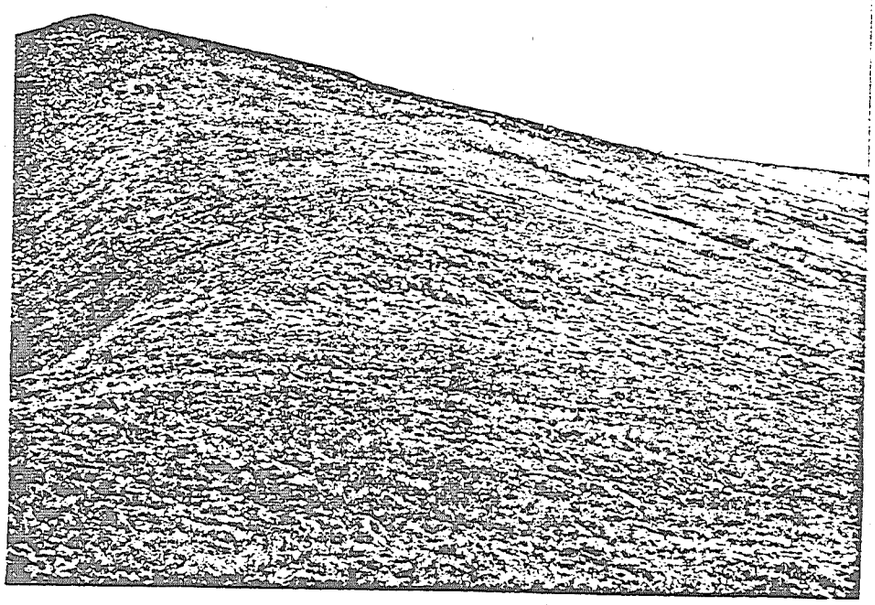


Photo 2. Cushion plant fellfield tundra on northwest side of Little Costilla Peak near summit.

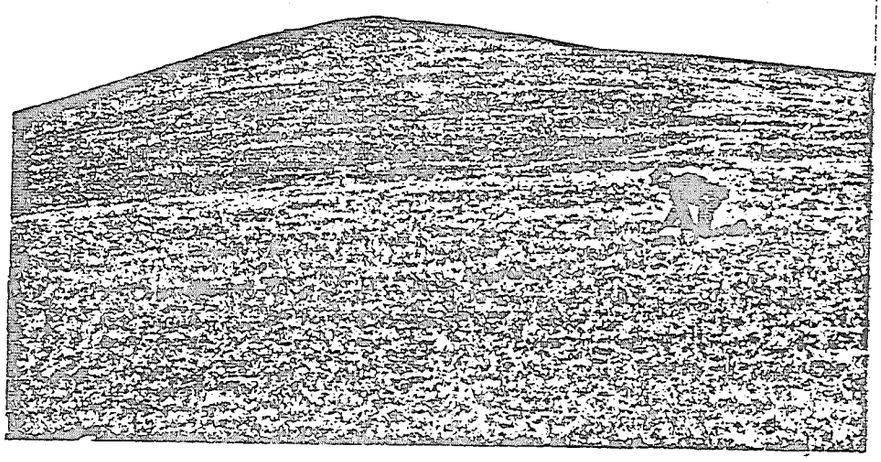


Photo 3. Kobresia bellardi cures to a golden hue in late summer on southwest slopes of Little Costilla Peak.

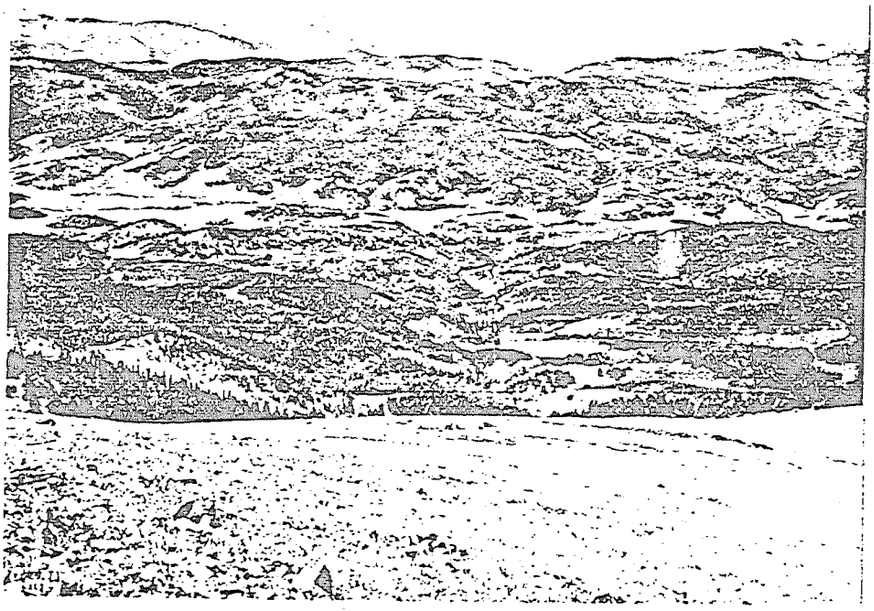


Photo 4. Little Costilla Peak RNA is an important summering ground for elk, a group of which are seen in the distance on the southwest slopes of the mountain. Logging area in the distance is outside the RNA.

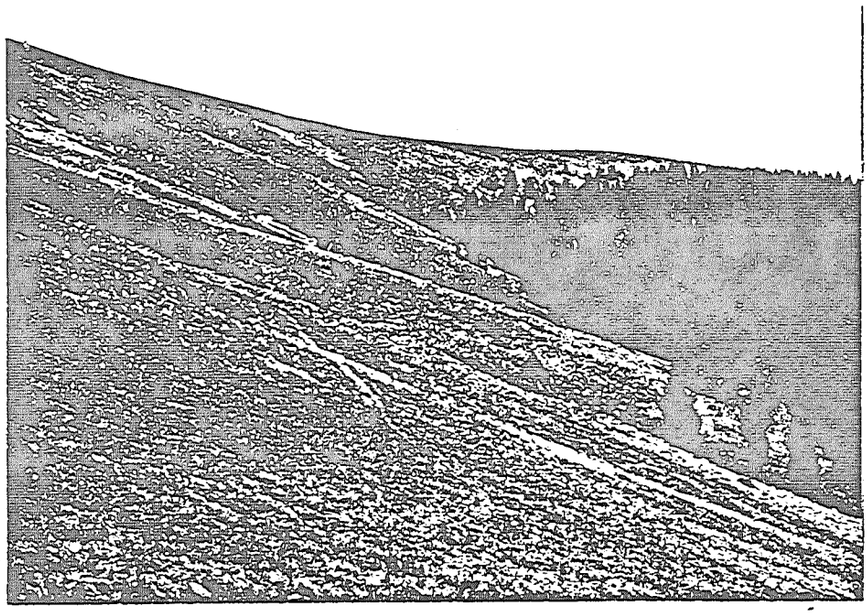


Photo 5. The demarcation line between the closed spruce-fir forest and the alpine tundra on the west flank of Little Costilla peak is sharp.

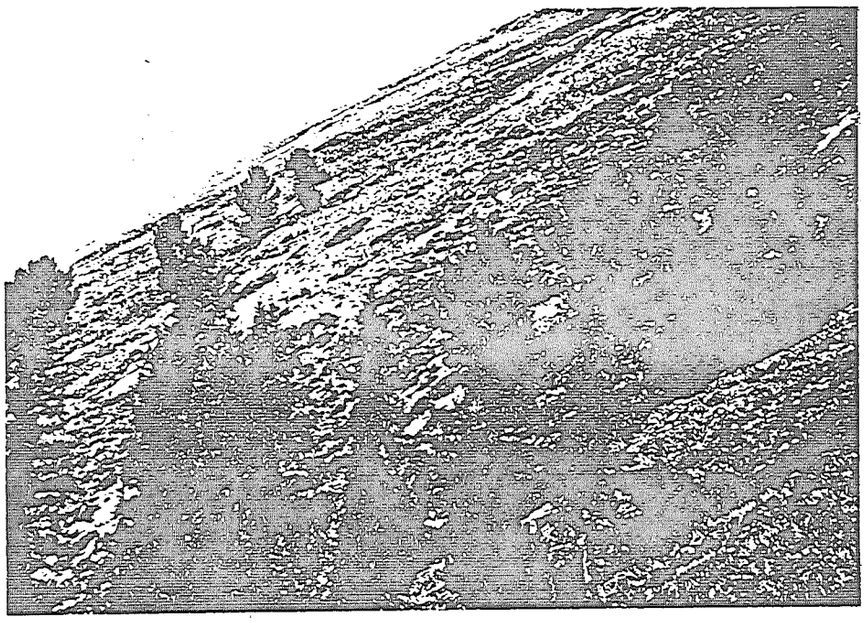


Photo 6. A narrow band of PIAR/FETH Habitat Type where Picea engelmannii and Pinus aristata codominate exists between the tundra and the closed spruce-fir forest below on the west-facing slopes of the mountain.

ESTABLISHMENT RECORD

for

LITTLE COSTILLA PEAK RESEARCH NATURAL AREA

within

Carson National Forest

Taos and Colfax Counties, New Mexico

DRAFT

3/26/87

INTRODUCTION

The Little Costilla Peak Research Natural Area (RNA) comprises approximately 650 acres (263.0 hectares) in the Sangre de Cristo Mountains of north-central New Mexico. The proposed RNA is located in the Questa Ranger District, Carson National Forest, in Taos and Colfax Counties, and is all acquired National Forest land.

Alpine tundra has been noted as an important high-elevation ecosystem for protection within the RNA program (USFS Regional Guide, 1983: Table 3-1). In July, 1982, a task group of the Regional RNA Committee investigated several candidate tundra areas proposed by the Carson National Forest. The Task Group concurred that Little Costilla Peak constituted the only real opportunity to provide suitable representation.

Land Management Planning

The need for representation of this biotic community was identified in the Southwestern Regional Guide (August 1983) although this particular site was not identified by name. The Carson National Forest Plan, implemented December 8, 1986, does not include the Valle Vidal portion of the Forest. The Little Costilla Peak, McCrystal Meadow, and Clayton Pass proposed Research Natural Areas are within the Valle Vidal. The Forest is presently working on an amendment to the Forest Plan to include the Valle Vidal. The environmental analysis (or EIS) prepared for the amendment will support the establishment of the three proposed Research Natural Areas. In the meantime the areas are designated for protection in the Multiple Use Area Guide for the Valle Vidal which has been approved by the Regional Forester. The management of the Valle Vidal will be governed by the Multiple Use Area Guide until the Forest Plan is amended to include the Unit.

JUSTIFICATION STATEMENT FOR ESTABLISHMENT OF AREA

Little Costilla Peak Research Natural Area was identified primarily as an outstanding example of an alpine tundra ecosystem. This is an important high-elevation ecosystem in the Southwest. The need to include such an ecosystem within the RNA network of the Southwestern Region has been stated in the Regional Guide (USFS 1983).

Little Costilla Peak should be added to the RNA system as it provides a secluded discrete unit for alpine study. The entire alpine community here can be considered fellfield, one of several important communities in the alpine of New Mexico. The alpine in New Mexico is unique due to its geographic location at the southern tip of the Rocky Mountains. This allows rapid evolution of new taxonomic entities and provides a unique opportunity for studies in plant systematics.

PRINCIPAL DISTINGUISHING FEATURES

Little Costilla Peak is a small isolated alpine island including all slope aspects from an elevational range of 11,400 feet (3474.7 m) to 12,584 feet (3835.6 m). Alpine conditions here are dry, windswept, and exposed. On the west side of the peak, a turf of Kobresia bellardi occupies the lower third of the alpine, with talus and loose gravel

AREA BY COVER TYPES

The distribution of cover types was determined from field surveys conducted in the summer of 1986 and from interpretation of 1981 aerial photography. Table 1 outlines the estimated total areas of vegetation types based on the Society of American Foresters forest type system (Eyre 1980) and the Küchler Potential Natural Vegetation system (Küchler 1964). Map 4 depicts the distribution of the SAF types, plus a tundra type not covered in the SAF forest categories, on the candidate research natural area.

Table 1. Estimated Areas of Vegetation Types in the Little Costilla Peak Research Natural Area.

Type	Society of American Foresters Cover Type[1]	Küchler PNV Type[2]	Surface Area Acres	Hectares
Engelmann Spruce - Subalpine Fir	SAF 206	K-21 Southwestern Spruce - Fir	241	97.5
Bristlecone Pine	SAF 209	K-22 Great Basin Pine Forest	138	55.9
Alpine Tundra	[none]	K-52 Alpine Meadows	271	109.6
		TOTAL:	650	263.0

[1]Eyre 1980.
[2]Küchler 1964.

PHYSICAL AND CLIMATIC CONDITIONS

Areas of this elevational range in northern New Mexico are generally classified as subhumid to humid in climate, and receive the greatest annual precipitation in the state. Average annual rainfall for Little Costilla Peak is 33 inches (838 mm), and average annual snowfall 79 inches (200.7 cm). Precipitation in the mountains comes in all seasons to a greater extent than it does in the arid and semiarid climates of New Mexico. Warm season rainfall (May to October), frequently from local orographic or convectional storms, accounts for 61% of the annual cycle of precipitation, with 39% falling as snow from cyclonic storms between November and April. Summer thunderstorms are more frequent in the peaks where the mountain slopes help trigger vertical movement in moist air that is already unstable, but greatest amount of precipitation per storm event is actually higher towards the bases of mountains. Mean annual temperature is a cool 28° F (-2.2° C), with a July high average of 54° F

Abbreviated Plant List for Little Costilla Peak RNA

Latin Name	Common Name[1]	Location[2]
GRASSES AND GRASS-LIKE PLANTS:		
Agropyron scriberni	Spreading wheatgrass	W
Agrostis variabilis	Wheatgrass	W
Calamagrostis purpurascens	Reedgrass	E S
Carex bella	Beautiful sedge	W
Carex ebenea	Ebony sedge	E
Carex festivella	Ovalhead sedge	E
Carex rupestris var. drummondiana	Sedge	W S
Festuca ovina var. ovina	Sheep fescue	E
Festuca ovina var. brachyphylla	Alpine fescue	E W S
Festuca thurberi	Thurber fescue	E
Juncus drummondii	Rush	E
Kobresia bellardi	Kobresia	E W S
Luzula spicata	Woodrush	E W
Phleum alpinum	Alpine timothy	E
Poa arctica	Arctic bluegrass	E
Poa canbyi	Bluegrass	E W
Poa glauca	Bluegrass	E W
Poa interior	Inland bluegrass	W
Poa nervosa	Wheeler bluegrass	E
Poa rupicola	Timberline bluegrass	E W S
Poa rupicola x Poa alpina [possibly]		E
Trisetum spicatum	Spike trisetum	E W
FORBS:		
Achillea lanulosa ssp. alpicola	Western yarrow	E
Agoseris aurantiaca	Orange agoseris	E
Androsace carinata	Rockjasmine	E W S
Androsace septentrionalis var. puberulenta	Rockjasmine	E W
Antennaria rosea	Rose pussytoes	E
Antennaria umbrinella	Pussytoes	E
Arenaria fendleri var. tweedi	Fendler sandwort	E W S
Arenaria obtusiloba	Sandwort	E W S
Arenaria rubella	Sandwort	E S
Artemisia pattersonii	Sagebrush	W S
Artemisia scopulorum	Sagebrush	W
Besseya oblongifolia	Kittentails	W
Campanula rotundifolia	Bluebell	E
Campanula uniflora	Bellflower	E
Carea albonigra	Carea	E
Castilleja haydenii	Paintbrush	E W S
Cerastium arvense	Starry mouse-ear	E

[1]Common names follow USDA, Forest Service 1974.

[2]Locations include:
E = East side [krummholtz of bristlecone pine and Engelmann spruce]
W = West side [kobresia turf overlying hummocked talus on lower 1/3; loose talus above]
S = South side [windswept rock and soil]

Abbreviated Animal List for Little Costilla Peak R.N.A.

Common Name	Latin Name
BIRDS:	
Bluebird, mountain	*Sialia currucoides*
Chickadee, mountain	*Parus gambeli*
Creeper, brown	*Certhia americana*
Crossbill, red	*Loxia curvirostra*
Eagle, golden	*Aquila chrysaetos*
Falcon, prairie	*Falco mexicanus*
Finch, Cassin's	*Carpodacus cassinii*
Finch, rosy	*Leucosticte arctoa*
Flicker, northern	*Colaptes auratus*
Flycatcher, western	*Empidonax difficilis*
Goshawk, northern	*Accipiter gentilis*
Hummingbird, broad-tailed	*Selasphorus platycercus*
Jay, Steller's	*Cyanocitta stelleri*
Junco, dark-eyed	*Junco hyemalis*
Kestrel, American	*Falco sparverius*
Kinglet, ruby-crowned	*Regulus calendula*
Lark, horned	*Eremophila alpestris*
Nutcracker, Clark's	*Nucifraga columbiana*
Nuthatch, pygmy	*Sitta pygmaea*
Nuthatch, red-breasted	*Sitta canadensis*
Owl, great-horned	*Bubo virginianus*
Pipit, water	*Anthus spinoletta*
Raven, common	*Corvus corax*
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Woodpecker, three-toed	*Picoides tridactylus*
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MAMMALS:	
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Coyote	*Canis latrans*
Elk	*Cervus elaphus*
Ermine	*Mustela erminea*
Gopher, northern pocket	*Thomomys talpoides*
Marmot, yellow-bellied	*Marmota flaviventris*

Geology

The east side of the peak is characterized by Jurassic and Triassic rocks undivided, including red, gray, and brown shale and sandstone; light-gray cross-bedded dune sandstone, and lensing limestone conglomerate. The Sangre de Cristo formation is dominant on the northwest quarter, with maroon to brownish-red, arkosic conglomerate; motley or brown, red and variegated sandstone; thin, modular non-arkosic limestone; siltstone and shale. The southwest quarter is distinguished primarily by Precambrian granite that is massive, pink to pinkish-orange, and porphyritic.

Soils

The thin soils of the Sangre de Cristo range, derived from granite and scraped over by glaciers, are less retentive of water than soils in some other New Mexican mountains. Soils are classified as Pergelic Cryumbrepts, loamy-skeletal, mixed. There are also significant amounts of rock outcrop.

Lands

All the land encompassed in the proposed RNA was donated to the National Forest Service by the Vermejo Park Corporation on December 30, 1981, under authority of the Donation Act of 1978. Kaiser Steel retains a vested interest in coal in the eastern, Colfax county portion of the RNA. There are no known rights-of-way within the proposed boundaries.

Cultural

A cursory cultural resource survey was performed in the immediate and adjacent area of the RNA. Several small (less than 0.01 acres) shallow mineral prospect pits and an old range fence were located. No prehistoric cultural resources were found. There may be isolated lithic scatters in the area, but it is doubtful that any cultural sites will be found in the RNA, due to the high elevation. Upon establishment as an RNA, the area will be withdrawn from any archeological research that would in any way modify the existing site. Withdrawal of this area from archeological research would not significantly affect the data base as very few and only ephemeral prehistoric occupations are expected to have taken place here.

IMPACTS AND POSSIBLE CONFLICTS

Mineral Resources

The proposed RNA is within an area that Exxon Corporation wished to prospect for leasable minerals. Exxon withdrew their lease application in 1986. The coal rights in the eastern, Colfax county portion of the area are owned by Kaiser Industries. There is, however, little likelihood of coal reserves in this area, based on a study by the National Park Service in 1979.

Grazing

Livestock use is minimal due to steep slopes and the remoteness of the area, though the western half of the RNA is included within the Valle Vidal Allotment. Fencing of the Little Costilla Peak RNA will be

harvest of timber or firewood and no assigned grazing capacity on Research Natural Areas. The prescriptions also prohibit off-road vehicle travel, open campfires, the introduction of non-native plant or animal species, road or trail construction, and recreational use if degradation results. However, non-motorized dispersed recreation activities are permitted provided they do not significantly modify the area, or threaten or impair the research or educational value of the area.

1. Vegetation Management

The Forest Plan provides that prescribed fire, using planned and unplanned ignitions, will be allowed on the Little Costilla Peak RNA to maintain fire dependent ecosystems. A fire management plan for the RNA will be developed at a later time.

2. Fences

As the area to the west of the RNA is currently obligated to livestock grazing, a protective fence will be necessary.

} will: do we want to leave this in. (New guidelines omit fencing.)

ADMINISTRATIVE RECORDS AND PROTECTION

Administration and protection of the Little Costilla Peak RNA will be the responsibility of the Carson National Forest. The District Ranger, Questa Ranger District, Questa NM has direct responsibility.

The Director of the Rocky Mountain Forest and Range Experiment Station, or his designee, will be responsible for any studies or research conducted in the area, and requests to conduct research in the area will be referred to him. He, or his designee, will evaluate research proposals and coordinate all studies and research in the area with the District Ranger. All plant and animal specimens collected in the course of research conducted in the area will be properly preserved and maintained within university or federal agency herbaria and museums, approved by the Rocky Mountain Station Director.

Records for the Little Costilla Peak RNA will be maintained in the following offices:

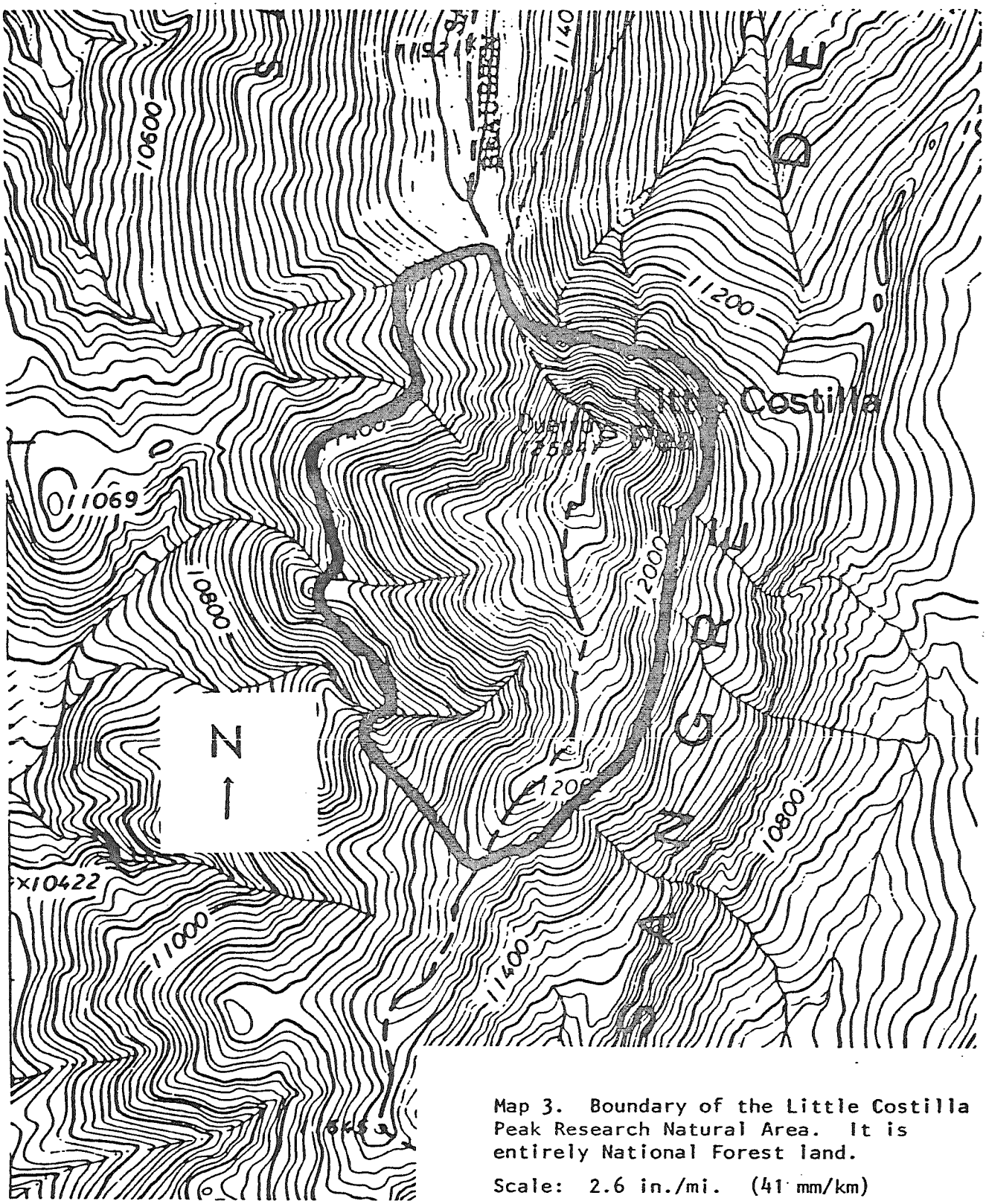
Regional Forester, Southwestern Region, Albuquerque, NM
Rocky Mountain Station, Fort Collins, CO
Carson National Forest, Taos, NM
District Ranger, Questa Ranger District, Questa, NM

DESIGNATION ORDER

By virtue of the authority vested in me by the Secretary of Agriculture under regulations 7 CFR 2.60(a) and 36 CFR 251.23, I hereby designate as the Little Costilla Peak Research Natural Area the lands described in the following establishment record prepared by William W. Dunmire and Mollie S. Toll, dated March 20, 1987. These lands shall hereafter be administered as a research natural area subject to the above regulations and instructions issued thereunder.

_____ _____

Chief Date



Map 3. Boundary of the Little Costilla Peak Research Natural Area. It is entirely National Forest land.

Scale: 2.6 in./mi. (41 mm/km)

USDA-FOREST SERVICE

PHOTOGRAPHIC RECORD

(See FSM 1643.52)

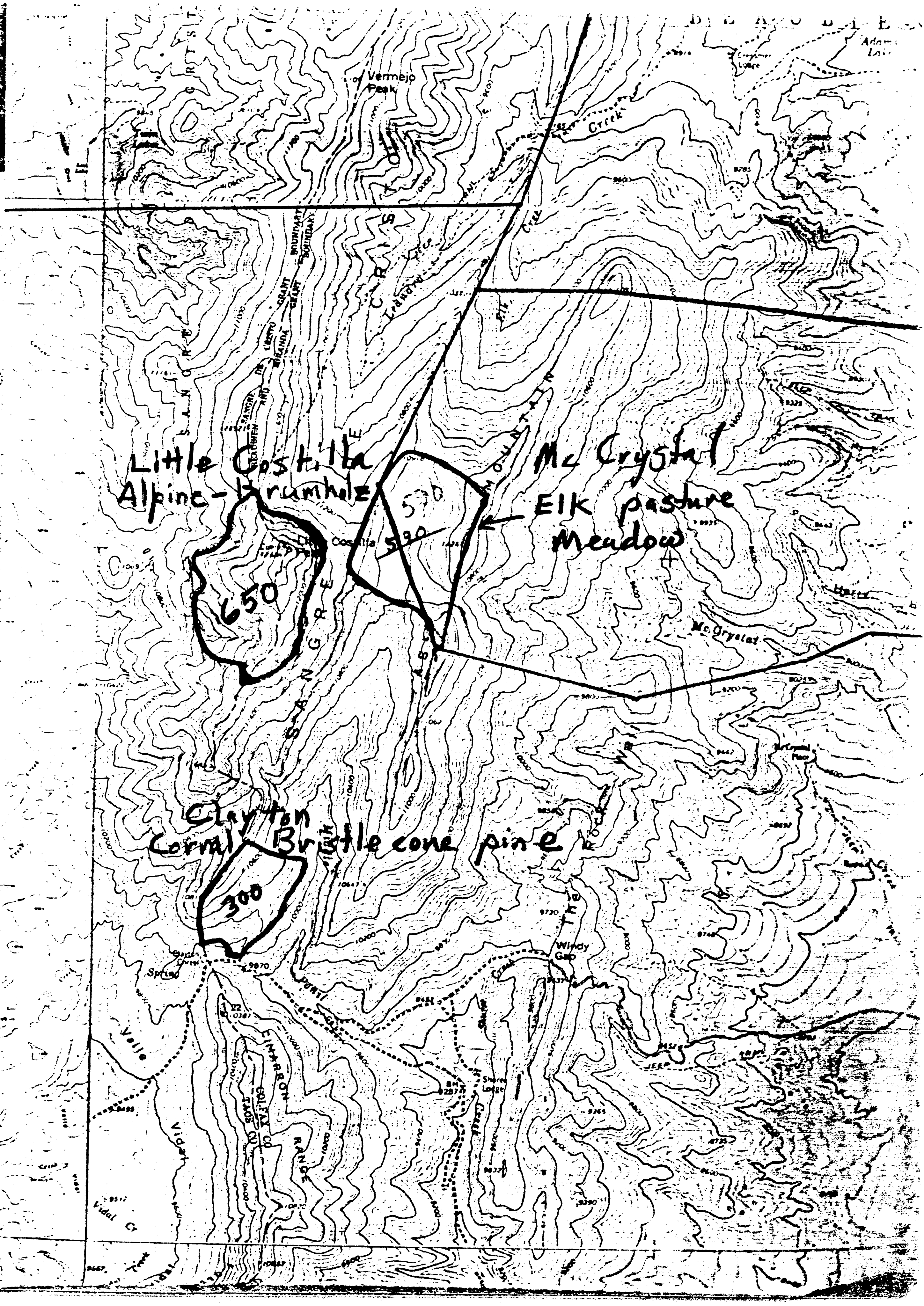
PHOTOGRAPHER	DATE SUBMITTED
William W. Dunmire	
HEADQUARTERS UNIT	**LOCATION**

INITIAL DISTRIBUTION OF PRINTS AND FORM 1600-1:

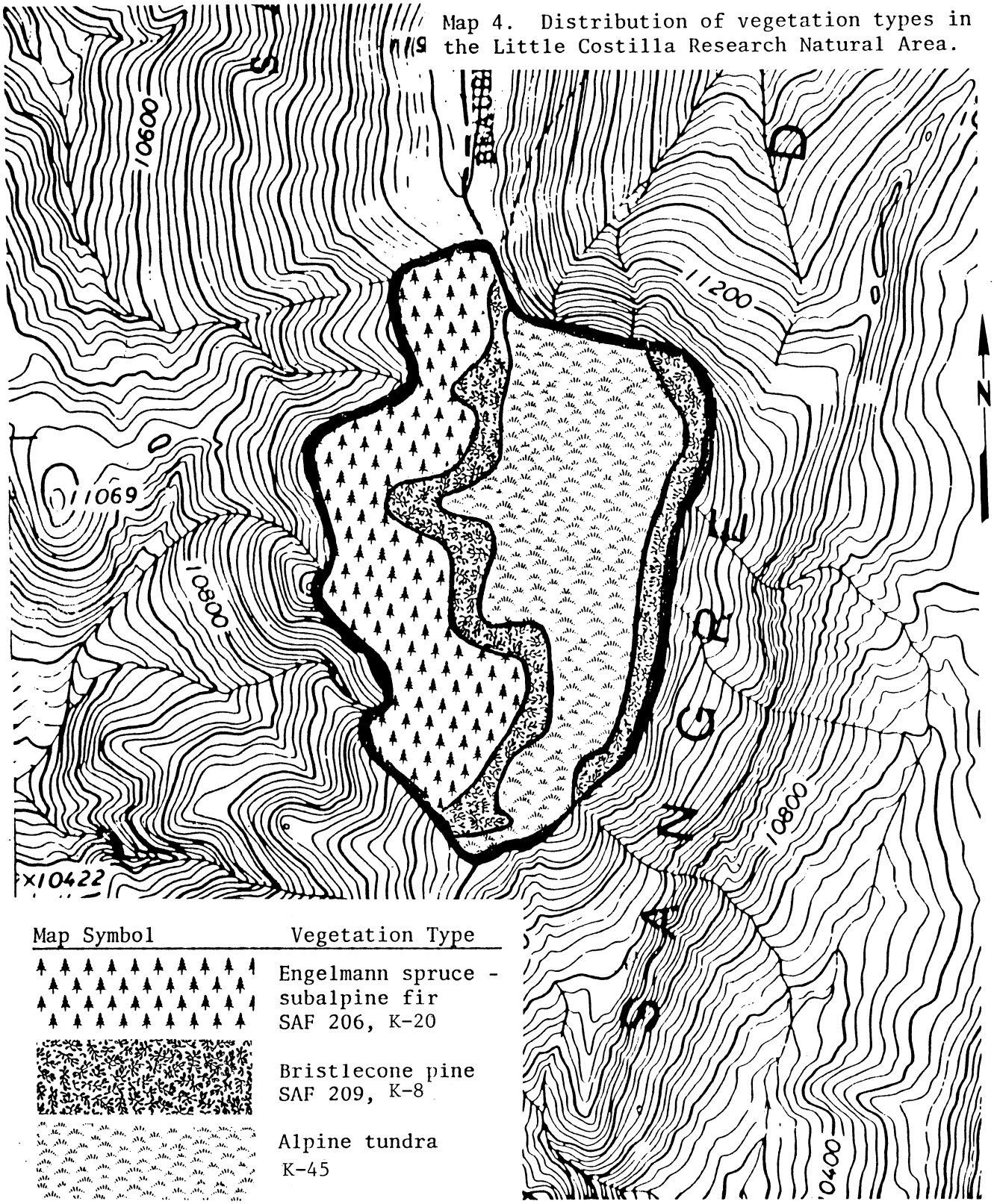
☐ WO ☐ RO ☐ DIV. ☐ FOREST ☐ DISTRICT ☐ PHOTOGRAPHER Date _____

INSTRUCTIONS: Submit to Washington Office in quadruplicate. Permanent numbers will be assigned and the forms will be distributed as follows: (1) Washington Office, (2) RO or Station, (3) Forest or Center and (4) Photographer.

PHOTOGRAPH NUMBER		SELECTED FOR W.O. PHOTO LIBRARY	DATE OF EXPOSURE	LOCATION *(State, Forest, District and County)*	CONCISE DESCRIPTION OF VIEW	NEGATIVE *(Show size and BW for black and white or C for color)*
TEMP. (1)	PERMANENT *(To be filled in by the WO)* (2)	(3)	(4)	(5)	(6)	(7)
				ALL: New Mexico Carson NF Questa Dist. Colfax Co.		ALL: 24x36mm color slides
1.			8-28-86		West toward Little Costilla Peak from McCrystal Meadow.	
2.			8-28-86		Little Costilla Peak summit from northwest ridge.	
3.			8-28-86		Kobresia tundra and alpine cushion plants on southwest slope of Little Costilla Peak.	
4.			7-08-86		Elk on southwest slope of Little Costilla Peak.	
5.			8-28-86		Edge of spruce-fir forest on west slope of Little Costilla Peak.	
6.			8-28-86		Picea engelmanii and Pinus aristida below tundra on west slope of Little Costilla Peak.	


Vermejo Peak
Little Costilla
Alpine-Krumholz
650
Mc Crystal
Elk pasture
Meadow
590
Clayton
Corral
Bristle cone pine
300
Windy Gap
McCrystal
Vidal Cr
CIMARRON RANGE
SANGRE DE CRISTO MOUNTAINS

Map 4. Distribution of vegetation types in the Little Costilla Research Natural Area.



Map Symbol	Vegetation Type
	Engelmann spruce - subalpine fir SAF 206, K-20
	Bristlecone pine SAF 209, K-8
	Alpine tundra K-45

USDA-FOREST SERVICE

PHOTOGRAPHIC RECORD

(See FSM 1643.52)

PHOTOGRAPHER	DATE SUBMITTED
William W. Dunmire	7/1/87
HEADQUARTERS UNIT	**LOCATION**

INITIAL DISTRIBUTION OF PRINTS AND FORM 1600-1:

☐ WO ☐ RO ☐ DIV. ☐ FOREST ☐ DISTRICT ☐ PHOTOGRAPHER Date _____

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6.			8-28-86		Picea engelmanii and Pinus aristata below tundra on west slope of Little Costilla Peak.	

Photo 1. West toward Little Costilla Peak from McCrystal Meadow showing east boundary of Little Costilla Peak RNA just above timber line.

Photo 2. Cushion plant fellfield tundra on northwest side of Little Costilla Peak near summit.

Photo 3. Kobresia bellardi cures to a golden hue in late summer on southwest slopes of Little Costilla Peak.

Photo 4. Little Costilla Peak RNA is an important summering ground for elk, a group of which are seen in the distance on the southwest slopes of the mountain. Logging area in the distance is outside the RNA.

Photo 5. The demarcation line between the closed spruce-fir forest and the alpine tundra on the west flank of Little Costilla peak is sharp.

Photo 6. A narrow band of PIAR/FETH Habitat Type where Picea engelmannii and Pinus aristata codominate exists between the tundra and the closed spruce-fir forest below on the west-facing slopes of the mountain.