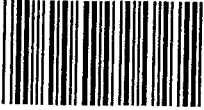


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Report on the Vegetation of the Flatirons
OSMP Studies 4082



Hogan, Tim

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CITY OF BOULDER PARKS DEPARTMENT

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A Report on the Vegetation
of the Flatirons Area:
Boulder Mountain Park
Boulder, Colorado

Tim Hogan
911 Pennsylvania
Boulder, CO 80502
(303) 441-5574
December 1995

A Report on the Vegetation
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Tim Hogan
911 Pennsylvania
Boulder, CO 80302
(303) 444-5577

15 December, 1995

Introduction

The City of Boulder Mountain Park is a significant natural area comprising more than six thousand acres. These forested foothills with their precipitous crags, protected canyons, and open mesas serve as one of the last low elevation refuges along the Colorado Front Range. Much of the Park is in the montane zone (*sensu* Marr 1961), which is characterized by a mixed forest of ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*). The area is mapped (T1S R71W) on the Eldorado Springs and Boulder U.S.G.S. Quadrangles.

The Flatirons are a scenic landmark of the Boulder area (Photo #1). They are a member of the Fountain Formation, a Pennsylvanian arkosic sandstone and conglomerate (Chronic and Chronic 1972). These steeply tilted cliffs are prized by climbers from around the world who come to the Boulder area to practice their craft. The Flatirons also serve as important habitat for a wealth of plants and animals (Hogan 1993, Jones 1990). They are home to cliff nesting birds and are important sites for a diverse flora of lichens, mosses, ferns, and flowering plants. It is critical that the biological riches of the Boulder Mountain Park are documented and that the perception of the Park as a recreational playground is balanced by an appreciation for the biodiversity harbored within its boundaries.

I made a botanical inventory of the many gulches, ravines, and canyons that weave among the Flatirons in 1995. This work focused on the area west of the Mesa Trail from the First Flatiron to Fern Canyon, and is a logical extension of the floristic surveys I have carried out in the Mountain Park (Hogan 1989, 1990, 1993). Unlike those projects which resulted in comprehensive species lists, this survey focused on identifying critical habitats, communities, and associations. This effort is viewed as an attempt to identify those areas that are biologically rich and most sensitive to human impact.

Methods

The survey began in mid May and continued through the 1995 field season. Eighty-five hours were devoted to this inventory and an attempt was made to visit as many different sites as possible (Map #1).

I walked the study area and made field notes on forest structure, species present, topography, the presence of social trails, and other relevant information. Plant collections were made if there was no prior documentation for them in the Park or if they represented a significant record for a particular site. In addition, collections were made for those species that were not identifiable in the field. In both cases, plants were only taken if the population could sustain the removal of a specimen. Collections are deposited at the University of Colorado Herbarium (COLO).

Site Description

In general, the habitat among the Flatirons can be characterized as steep, dry, and relatively depauperate in vascular plant species. Exceptions to this are found where moisture is present as a result of aspect, topographic position, or the presence of springs that provide a perennial source of water. Douglas-fir Forest was the dominant vegetation type in the study area. A thorough discussion of the Boulder Mountain Park's location, climate, geology and soils, and vegetation can be found in Hogan (1993).

The most common plant association in the study area was Douglas-fir/Oregon grape (*Pseudotsuga menziesii*/*Mahonia repens*). This is one of the most depauperate plant associations in the Mountain Park and is characterized by a xeric moisture regime and the low presence and coverage of other plant species. Ponderosa pine (*Pinus ponderosa*), common juniper (*Juniperus communis*), and forest sedges such as *Carex rossii* and *C. geyeri* are typically present in this habitat type. White veined pyrola (*Pyrola picta*), a species of special concern on the Colorado Natural Heritage plant list (CNHP 1995), was sporadically found here. These stands pose a significant fire hazard in that standing trees are often dense and large amounts of dead wood are present. The potential for a catastrophic fire in the

Flatirons is ameliorated by the extensive cliff and talus systems that dissect the area. Nevertheless, the possibility for a large scale fire exists and needs to be addressed in management decisions. Representative sites for *Pseudotsuga menziesii/Mahonia repens* were observed on the Royal Arch trail north of Sentinel Pass and in the drainage (Shanahan Canyon) south of The Slab (Photo #2).

Douglas-fir forests with a more developed understory are found in less xeric habitats, often on north facing slopes or in sites shaded by steep canyon walls. Some of the trees and shrubs that mark these habitats are Boulder raspberry (*Oreobatus deliciosus*), chokecherry (*Padus virginiana*), currant (*Ribes cereum*), mountain maple (*Acer glabrum*), ninebark (*Physocarpus monogynus*), ponderosa pine (*Pinus ponderosa*), waxflower (*Jamesia americana*), and wild raspberry (*Rubus idaeus*). Common understory herbs are alum root (*Heuchera parvifolia*), arnica (*Arnica cordifolia*), false solomon's seal (*Maianthemum amplexicaule*), geranium (*Geranium caespitosum*), sweet cicely (*Osmorhiza depauperata*), and violet (*Viola scopulorum*).

Hess and Alexander (1986) recognize two distinct plant associations in this group: *Pseudotsuga menziesii/Physocarpus monogynus* and *Pseudotsuga menziesii/Jamesia americana*. They describe the former as a "topographic climax" and the latter as an "edaphic climax", with the *Jamesia* association being found on moister sites than the *Physocarpus* association. This agrees with my observations in the Boulder Mountain Park, although the difference is more of degree than of kind. Compared to the *Pseudotsuga menziesii/Mahonia repens* association, these forests marked by layers of trees, shrubs, and understory herbs provide a rich habitat for birds and other small animals. Trail projects and other human developments should avoid such forest types in order to protect these populations. Representative sites for these habitat types were observed southwest of the Ironing Boards and northwest of the Fifth Flatiron (Photo #3).

Although small in expanse, the vegetation associated with mesic sites represent an important component of the Mountain Park's biodiversity. These areas are typically found in

the bottoms of gulches, ravines, and canyons, and are characterized by a deciduous vegetation. While most bottoms sustain a shrubby flora (eg. upper Bluebell Canyon near the Ironing Boards), only those with sufficient perennial moisture can support the full wealth of species that distinguish these sites. Trees and shrubs characterizing these riparian ribbons are alder (*Alnus incana*), aspen (*Populus tremuloides*), box-elder (*Negundo aceroides*), cottonwood (*Populus angustifolia* & *P. deltoides*), dogwood (*Swida sericea*), hazelnut (*Corylus cornuta*), river birch (*Betula fontinalis*), and willow (*Salix bebbiana*). Herbaceous species occurring in these habitats include black snakeroot (*Sanicula marilandica*), broad-lipped twayblade (*Listera convallarioides*), bog orchids (*Limnorchis dilatata* & *L. hyperborea*), bush honeysuckle (*Distegia involucrata*), dwarf raspberry (*Cylactis pubescens*), lady fern (*Athyrium filix-femina*), male fern (*Dryopteris filix-mas*), twisted stalk (*Streptopus fassettii*), and wild sarsaparilla (*Aralia nudicaulis*).

Many species found in these habitats are of special concern and mark the mesic foothill canyons as important refugia for relictual species from the Pleistocene (Hogan 1993, Weber 1965). These sites deserve the greatest level of protection in order to preserve their biological riches. Human disturbance should be minimized and no new trails should encroach upon these areas. Representative sites for this mesic vegetation were observed near the narrows of Skunk Canyon, at the lower reaches of the drainage to the northwest of the Fern Canyon saddle, and in the north facing drainages that drop off the west ridge of Bear Peak (Photo #4).

Rock and talus make up nearly 10% of the Boulder Mountain Park (Jones 1990) and was an important component of the 1995 study area. These areas are important for the cryptogamic flora of ferns, mosses, and lichens they harbor. A striking feature observed in this inventory was the prevalence of bracken fern (*Pteridium aquilinum*) at the base of cliff faces throughout the Flatirons. These "bracken gardens" must thrive in these sites due to the periodic runoff of moisture from the faces. Carrion flower (*Smilax lasioneuron*), a vining species tracked by the Colorado Natural Heritage Program (CNHP 1995), was common on bracken at the base of The Slab. Grass fern (*Asplenium septentrionale*), another species of

special concern (CNHP 1995), was not uncommon on cliffs throughout the study area. No additional populations of maidenhair fern (*Asplenium trichomanes*) were located beyond the one known previously from the narrows of Skunk Canyon. Polypody (*Polypodium amorphum*) was scattered throughout the study area on cooler, north facing cliffs. The club moss, *Selaginella weatherbiana*, a species watchlisted by CNHP (1995), was often found in association with the polypody.

The cryptogamic flora of mosses and lichens - a flora concentrated, if not restricted, to cliffs, rock, and talus - represent a very rich and little understood element of species diversity in the Mountain Park (W.A. Weber pers. com.). Dozens of mosses and lichens may be found on any given substrate - species that can only be sorted and identified by a limited number of experts. It is sobering to realize that the loss of unknown species is not a tragedy restricted to tropical rainforests, but may be occurring in our own backyard. The greatest threat to cryptogamic species on cliff faces is from rock climbing. These species will be protected to the extent that climbing can be restricted to established routes and the development of new areas limited. Representative sites for vegetation associated with the Fountain sandstone were observed at the base of The Slab, on the northeast facing cliff in the drainage west of the Fern Canyon saddle, and among the crags around the Fifth Flatiron (Photos #5,6,& 7).

Sites of Special Concern

In this section I will discuss sites in the study area that deserve special protection due to current threats, high species richness, or because they are particularly vulnerable to human disturbance (Map #2).

Skunk Canyon, west of the Mesa Trail (central portion of SEC12) is of special concern. A well established social trail is present, the area is rich in species, and human use may pose a threat to both the flora and fauna of the canyon. The site in Skunk Canyon known as "The Narrows" at about 6600' has the greatest concentration of fern species in the Mountain Park of which I am aware. The area above the Narrows is a rich forest with an

understory marked by wild sarsaparilla (*Aralia nudicaulis*). The drainage below 7200' is a perennial stream that supports a rich assemblage of deciduous trees and shrubs. White veined pyrola (*Pyrola picta*) is not uncommon on the drier, north facing slopes west of Dinosaur Mountain. Because of its proximity to the Mesa Trail and a number of fine climbing routes in its lower reaches, Skunk Canyon receives a high degree of casual use. This use is exacerbated as the social trail(s) becomes more established and as hikers make their way into the upper canyon. Because of the steep terrain and the shallow soils, this use has led to increased disturbance. South facing slopes and the upper canyon are marked by cheat grass (*Anisantha tectorum*) and other non-native weeds (Photo #8). The Mountain Park has been successful in restricting access to Skunk Canyon for the protection of cliff nesting raptors during their breeding season. Further protection should be considered through education and/or a zone management policy that identifies this area as a sensitive natural area in which human use is discouraged. If use is not curtailed, the current social path will become so well established that the Park will have no choice but to recognize and maintain it as an official trail.

Another area of special concern is the northwest slope of Bear Peak (NW1/4 SEC13), and in particular, the two drainages that empty into Bear Canyon near the dogleg of the power line at 7080' (Photo #9). These drainages are akin to those areas on the northwest side of Green Mountain and on the west side of South Boulder and Bear Peaks (Hogan 1989, 1990, 1993). This habitat is characterized by a wealth of species with eastern woodland affinities and a rich diversity of plant and animal life. The drainages on the northwest side of Bear Peak do not appear to be threatened by human disturbance at the present time. The West Ridge Trail funnels hikers away from the area and no cliffs are present to attract climbers. Nevertheless, the Mountain Park should note this site as an area of biological significance to be protected for its ecological values.

The drainage that drops into Bear Canyon from the head of Fern Canyon (NE1/4 SEC13) is not as rich as those drainages further west, but is more threatened by human disturbance due to the attraction it holds for hikers who look into it from the Fern Canyon

saddle (Photo #10). A pictorial guide sold in local shops, "A Bird's Eye View of the Boulder Mountain Parks", notes a "Hardscrabble Trail" in this drainage. I did not find a well established social trail in the area, but such publicity can only attract more use.

I spent several days exploring the steep and dry terrain of upper Bluebell Canyon, the areas west of Royal Arch and Mallory Cave, and the territory west of The Slab. While there are many climbing routes scattered throughout these craggy forests, I did not observe a high level of use. Because this terrain is so precipitous and the soil so shallow, these areas are not resilient to much foot traffic and it will be important for Mountain Park Rangers to continue to monitor this situation.

It is fortunate that most Park users prefer to use established trails out of convenience and out of respect for the environment. Nevertheless, every unnamed canyon and gully I examined displayed some level of use, and every drainage showed increased levels of impact the closer it got to the Mesa Trail. With the explosive population growth along the Front Range and the concomitant increase in Park use, an aggressive education program should be initiated that stresses the need to stay on trails. People have to be convinced that untrailed canyons and drainages are important habitats that deserve to be left inviolate. If education is not sufficient it may become necessary to consider enforceable ordinances.

Conclusion

The City of Boulder Parks and Open Space exist as a uniquely managed landscape along the Colorado Front Range. With increasing urbanization and the loss of biological diversity worldwide, the wisdom of the Boulder community to protect these areas is becoming ever more apparent.

The most immediate threats to the Boulder Mountain Park come from an extremely high level of recreational use. Various recommendations have been made to ameliorate these impacts — discouraging off trail hiking, prohibiting certain uses, closure of sensitive areas, increased education. Other threats jeopardize the ecological integrity of the Mountain Park,

threats less tractable and not as susceptible to Park management decisions alone. These include the growing specter of invasive weeds, the regional danger of catastrophic fire, the increasing pressure on Park borders by residential development, and the impacts on wildlife populations that utilize other lands surrounding the Park. These problems demand cooperation between the Boulder Mountain Park and the Forest Service, City and County Open Space, surrounding landowners, and regional planners. Without such cooperation the Park will become increasingly isolated and vulnerable to these external threats.

The recent expansion in human numbers along the Front Range has increased impacts on natural areas, placing additional pressure on resource managers. This rise in regional population is part of a larger global and national pattern. The worldwide net gain in human numbers stands at three people per second (Meffe & Carroll 1994) and a major demographic shift in the United States has brought people from both coasts to the Intermountain West.

We are witness to an increasing intolerance and contentiousness in our community, our nation, and across the world. As populations expand and resources dwindle, it is perhaps inevitable that different user groups will become increasingly polarized. From the halls of Congress to the hills of the rural west, people are embroiled in debates over the best use of our natural resources. However, all too often, an entire constituency is left out of the discussion. These are the dispossessed without a human voice - the plants and animals trampled beneath hiking boots, running shoes, off-road vehicles, and bulldozers.

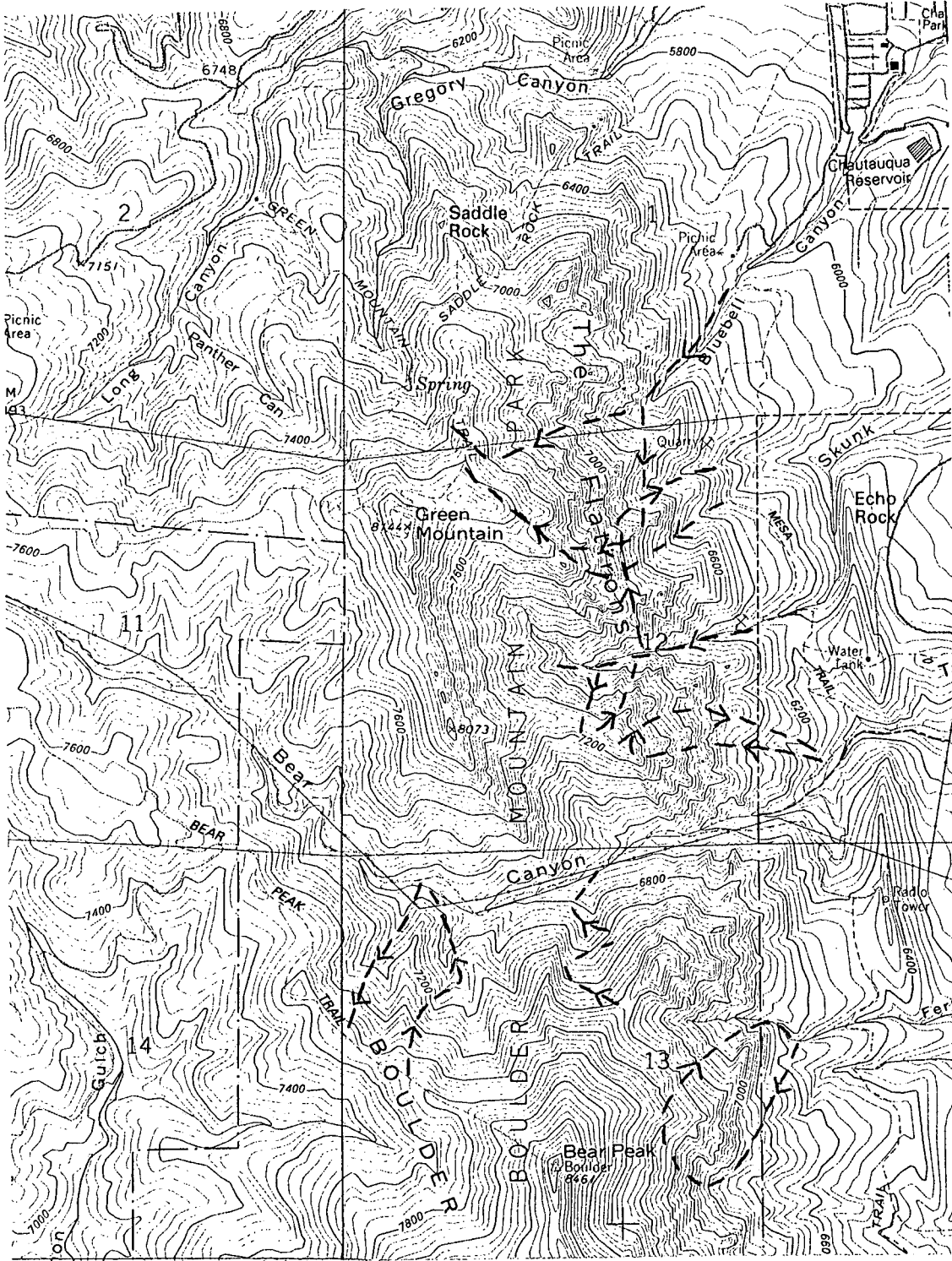
The voice of its non-human inhabitants must be heard if the ecological integrity of the Boulder Mountain Park is to be protected into the 21st Century. The most stringent law enforcement and the best resource information will not succeed if users do not appreciate the inherent right of other species to live out their lives in the environment where they have evolved over the millennia. People coming to Boulder from heavily populated metropolitan areas may understandably view the Mountain Park as a pristine area. Long time residents may take the Park for granted. All users need to be educated and encouraged to care for the area, not as a "park" with its connotation of recreation, but as a nature preserve harboring

unique life forms and complex ecological processes. Many of the dilemmas facing managers might be more easily resolved if the Boulder community could make this shift in perception from *Boulder Mountain Park* to *Boulder Mountain Nature Preserve*. Off trail hiking, closure of sensitive habitats, controlled burns, and other management decisions could be placed in the context of their effect on ecological integrity rather than as constraints on individual freedom.

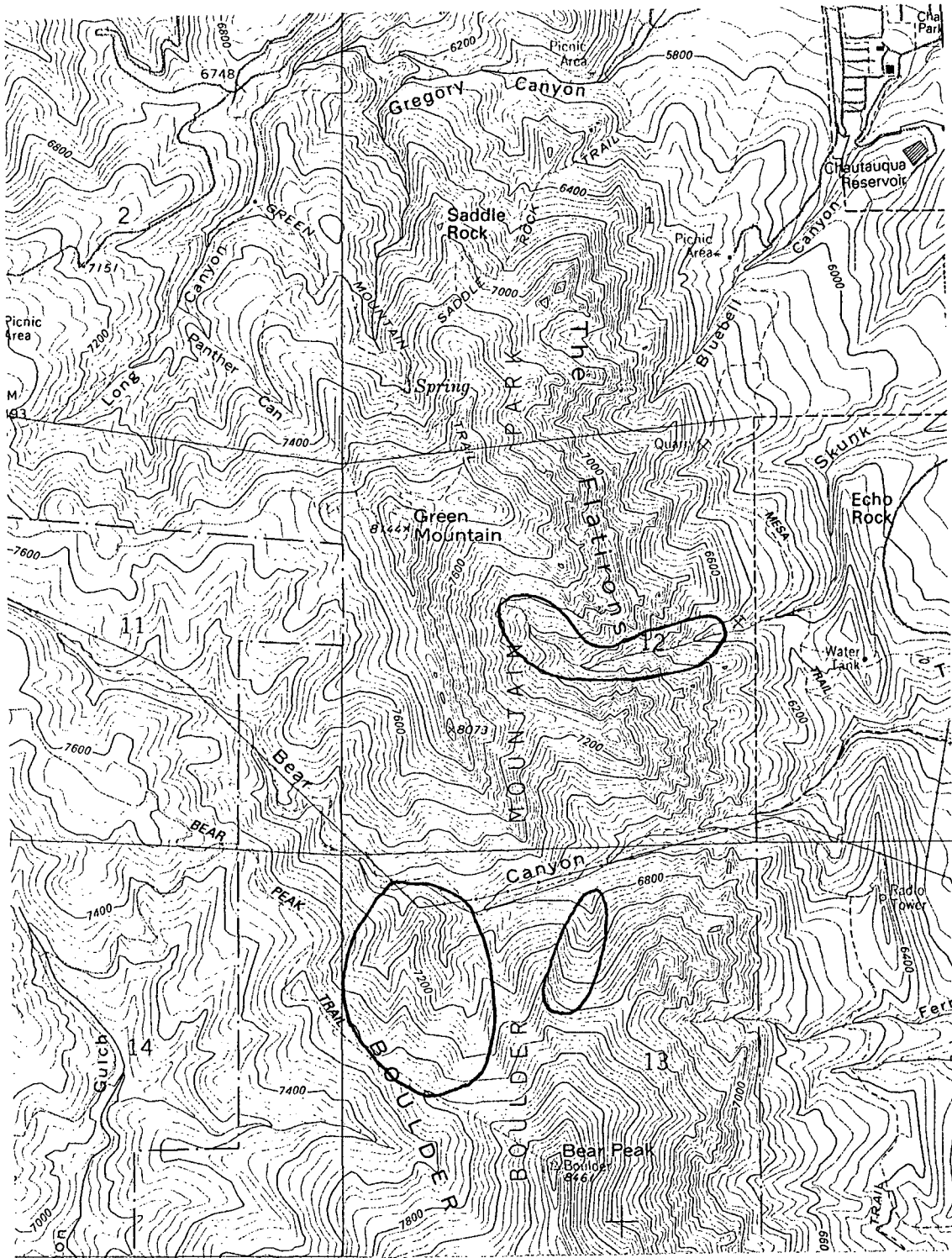
The Boulder Mountain Park is a touchstone of the Boulder community and our welfare as a community is inextricable from the health of the Park. We will prosper as a citizenry to the extent that we can protect and care for the forests and mountains upon which we look each day.

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Map 1. Study Site with routes walked



Map 2. Study Site with areas of special concern



Photo 1. Study Area



Photo 2. Douglas Fir/*Mahonia repens* habitat south of The Slab



Photo 3. *Pseudotsuga* forest with shrubby understory near Fifth Flatiron

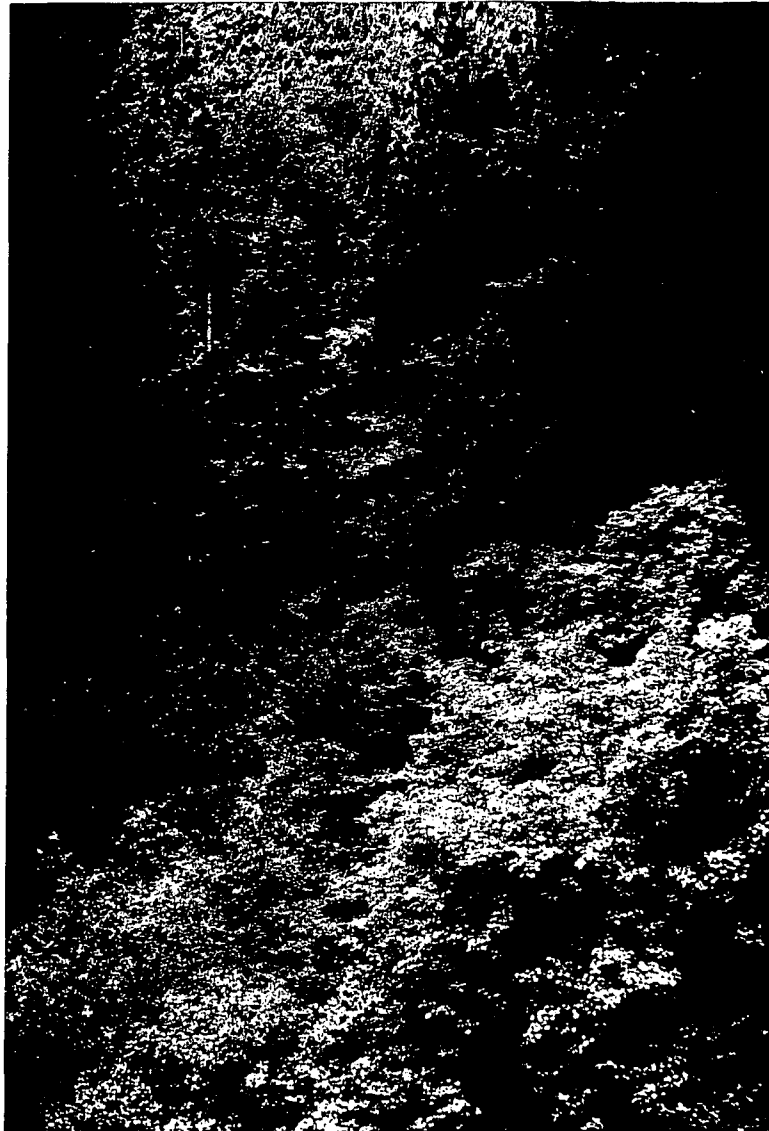


Photo 4. Mesic draw with *Alnus* and *Betula*, NW side of Bear Peak



Photo 5. Bracken garden at base of The Slab



Photo 6. Moss rock SE of Royal Arch



Photo 7. Fountain sandstone with vegetation near Fifth Flatiron



Photo 8. Dry, south facing slopes in Skunk Canyon



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Photo 9. Rich forest, NW side of Bear Peak



Photo 10. Drainage NW of Fern Canyon saddle

APPENDIX

Additions to the Flora of the Boulder Mountain Park

This list is a supplement to the floristic survey of Hogan (1993). These species have been collected or observed subsequent to that work, either in the Mountain Park or in the immediate vicinity such that their occurrence in the Park is likely. Doudy Draw refers to City Open Space directly south of the Mountain Park and southeast of Eldorado Canyon State Park. Numbers in brackets [#] represent the collection number of Hogan unless otherwise noted. Specimens are deposited in the University of Colorado Herbarium (COLO).

Acrolasia dispersa (Watson) Davidson [*Mentzelia dispersa* Wats.] Talus, Eldorado Mountain. [2192]

Allium geyeri Watson ONION. Woodlands and meadows. [2096]

Anagallis minima (L.) Krause CHAFFWEED. [*Centunculus minimus* L.] Moist sites, Enchanted Mesa.
[Wittmann 813]

Aphyllon uniflorum (L.) Torrey & Gray BROOMRAPE. [*Orobanche uniflora* L.] Bull Gulch area.
[2095]

Arceuthobium vaginatum (Willdenow) Presl DWARF MISTLETOE. On ponderosa pine.

Asperugo procumbens L. MADWORT. Doudy Draw; adventive. [2011]

Asplenium trichomanes L. MAIDENHAIR SPLEENWORT. Known from one site in Skunk Canyon just west of the Mesa Trail. [2523]

Aster lanceolatus Willdenow ssp. *hesperius* (Gray) Semple & Chmielewski Moist sites, Doudy Draw.

Astragalus sparsiflorus Gray Gregory Canyon. [Evans 332]

Bassia sieversiana (Pallas) Weber IRONWEED. [*Kochia sieversiana* (Pallas) Meyer; *K. scoparia* of the Colorado lit.] Doudy Draw, adventive.

Besseyia plantaginea (Bentham) Rydberg KITTENTAIL. Doudy Draw. [Lederer s.n.]

Bidens frondosa L. BEGGAR'S TICK. Moist sites, Gregory Canyon; adventive. [Campbell 617]

Campanula rapunculoides L. HAREBELL. McClintock Trail; adventive. [2272]

Carex festivella Mackenzie Gregory Canyon. [Ramaley 3804]

Carex scoparia Schkuhr ex Willdenow Moist sites, Doudy Draw. [2345]

Carum carvi L. CARAWAY. Doudy Draw. [2090]

Caucalis daucoides L. Anemone Hill; adventive. [May s.n.]

Castilleja sessiliflora Pursh PAINTBRUSH. NCAR Mesa. [1994]

Cerastium fontanum Baumgartner COMMON MOUSE-EARS. Moist sites; adventive. [1194, 2086]

Ceratochloa carinata (Hooker & Arnott) Tutin RESCUEGRASS. [*Bromus carinatus* Hook. & Arnott, *B. marginatus* Nees] Doudy Draw; adventive. [2205]

Chondrosium hirsutum (Lagasca) Sweet GRAMA GRASS. [*Bouteloua hirsuta* Lag.] Mesa tops. [Hunting 134]

Chrysothamnus nauseosus (Pallas ex Pursh) Britton RABBIT BRUSH. Doudy Draw.

Cyclachaena xanthifolia (Nuttall) Fresenius MARSH ELDER. [*Iva xanthifolia* Nutt.] Gregory Canyon
[Campbell 580]

Descurainia pinnata (Walter) Britton TANSY MUSTARD. NCAR Mesa. [1996]
Digitalis purpurea L. FOXGLOVE. Mesic sites, Doudy Draw; adventive. [2209]
Ellisia nyctelea (L.) L. Moist site, Flagstaff Mt.; adventive. [Olmstead s.n.]
Holosteum umbellatum L. Enchanted Mesa and NCAR mesa; adventive. [1993]
Ipomopsis spicata (Nuttall) Grant SPIKE GILIA. [*Gilia spicata* Nutt.] NCAR Mesa.
Juncus articulatus L. Moist site, Doudy Draw; adventive. [2505]
Juncus compressus Jacquin Moist site, Doudy Draw; adventive. [2201]
Ligularia pudica (Greene) Weber [*Senecio pudicus* Greene] Eldorado Mountain. [Lederer 4378]
Mentha spicata L. SPEARMINT. Doudy Draw; adventive.
Mimulus glabratus Humboldt, Bonpland & Kunth MONKEYFLOWER. Muddy sites, Doudy Draw.
[2352]
Muhlenbergia asperifolia (Nees & Meyen) Parodi Moist sites, Doudy Draw.
Myosotis scorpioides L. FORGET ME NOT. Moist sites, Doudy Draw; adventive. [2087]
Nuttallia speciosa (Osterhout) Greene BLAZINGSTAR. [*Mentzelia speciosa* Osterhout] Dry, exposed sites, Doudy Draw.
Pediocactus simpsonii (Engelmann) Britton & Rose BALL CACTUS. Dry sites, Doudy Draw.
Phalaroides arundinacea (L.) Rauschert REED CANARYGRASS. [*Phalaris arundinacea* L.] Wet sites, Doudy Draw; adventive.
Polanisia dodecandra (L.) De Candolle CLAMMY WEED. Doudy Draw.
Pseudognaphalium viscosum (H.B.& K.) Weber CUDWEED. [*Gnaphalium viscosum* H.B.& K., *G. macounii* Greene] Long Canyon; adventive. [Weber s.n.]
Puccinellia airoides Watson & Coulter ALKALIGRASS. Wet sites, Doudy Draw.
Sagittaria cuneata Sheldon ARROWHEAD. Wet, muddy sites. [Shawver 427]
Salvia reflexa Hornemann Doudy Draw; adventive.
Schoenoplectus pungens (Vahl) Palla BULRUSH. [*Scirpus americanus* of the Colorado literature]. Wet sites, Doudy Draw.
Sonchus asper (L.) Hill SOW THISTLE. Doudy draw; adventive.
Triodanis leptocarpa (Nuttall) Nieuwland NCAR Mesa. [2196]
Viola praemorsa Douglas ex Lindley Gregory Canyon. [Evans 335]
Vulpia octoflora (Walter) Rydberg SIXWEEK FESCUE. [*Festuca octoflora* Walter] NCAR Mesa.