Assessment of resource changes in backcountry campsites from 1989-1996 in Rocky Mountain National Park, Colorado
by Victoria Grace Steele

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Earth Sciences
Montana State University

Abstract:
One of the major contributing factors affecting wilderness resources is camping. The objectives of this study were to describe the resource changes that occur in backcountry campsites in Rocky Mountain National Park as measured by campsite area and campsite score from the Backcountry Campsite Impact Assessment and Monitoring System (BCIAMS).

Six categories, with several sub-categories each, were tested for change in area and total BCIAMS score. Categories were relative aspect, campfire, campsite type, distance from the trailhead, elevation and use. Each sub-category was analyzed independently and for each test, missing area measurements, or total scores of zero were dropped from that analysis. This produced different numbers of campsites in each test.

Most sites increased in area over time, but most sites decreased in total score over time. Sites that increased significantly in area over time were: northeast, southeast, northwest, no fire, campfire, individual, any distance from the trailhead, low or moderate in elevation and heavily used. Sites that increased significantly in total score over time were southwest and no fires. Stock sites decreased significantly over time in total score. Use was positively correlated to an increase in campsite area and total score.

Group and group/stock sites had larger areas than all other site types. Stock sites had larger areas than individual sites. Group/stock sites had higher total scores than all other site types. Campsites far from the trailhead had larger areas than sites close to the trailhead. Moderate elevation sites had higher total scores than low elevation sites.

A model of the life cycle of a campsite was adapted from Cole (1994). The decrease in BCIAMS scores, along with yearly campsite improvements has shown that impacts to campsites be reversed and allow the campsite to reach a long term steady state.

This study demonstrated the validity of assessing, monitoring and managing campsites over time. Managing campsites increases their aesthetic quality, concentrates use, and can reverse the rate of degradation. With continued management of campsites, our natural areas can be preserved for future generations.

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APPROVAL

of a thesis submitted by

Victoria Grace Steele

This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies

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Andrew Marcus — Andrew Marcus (Signature) — 2-19-98 (Date)

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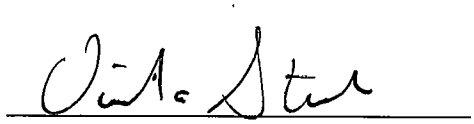
Signature 

Date 2/19/98

Thou hast a voice, great Mountain, to repeal
Large codes of fraud and woe; not understood
By all, but which the wise, and great, and good
Interpret, or make felt, or deeply feel.

Percy Bysshe Shelley (1792-1822), English poet. Mont Blanc

This thesis is dedicated to:
Clarence 'Zumi' Zumwalt (1912-1996), Long's Peak Ranger
Larry 'Dean' Bowyer (1948-1996), Rocky Mountain Rescue Group
Homer Rouse (1936-1996), Superintendent, Rocky Mountain National Park (1993-1995)

These three men had a passion for the mountains that brought joy and meaning into the lives of everyone around them. Hopefully the results of this study will help preserve the mountains that they loved.

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ABSTRACT

One of the major contributing factors affecting wilderness resources is camping. The objectives of this study were to describe the resource changes that occur in backcountry campsites in Rocky Mountain National Park as measured by campsite area and campsite score from the Backcountry Campsite Impact Assessment and Monitoring System (BCIAMS).

Six categories, with several sub-categories each, were tested for change in area and total BCIAMS score. Categories were relative aspect, campfire, campsite type, distance from the trailhead, elevation and use. Each sub-category was analyzed independently and for each test, missing area measurements, or total scores of zero were dropped from that analysis. This produced different numbers of campsites in each test.

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CHAPTER 1

INTRODUCTION

Objectives

The goals of the United States National Park Service include protecting the natural resources of the parks while at the same time managing them for the peoples' enjoyment and use. To effectively manage the parks' natural resources, it is important to understand how the resources are used by wildlife and people, what the major contributing factors are to changes in the resources over time, and how the resources respond to these different factors. One of the major contributing factors to change in backcountry resources is camping. The objective of this study were to describe the resource changes that occur in backcountry campsites in Rocky Mountain National Park as measured by the area of the campsite and as scored by the Backcountry Campsite Impact Assessment and Monitoring System (BCIAMS).

The Organic Act (1916) (16 United States Code (USC) 1) states that the National Park Service is responsible for:

> "...conserving the scenery and the natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations."

In partial fulfillment of the Organic Act, Rocky Mountain National Park initiated the Backcountry Campsite Impact Assessment and Monitoring System in 1989 (Thompson, 1988).

The purpose of BCIAMS was to inventory, assess, and monitor impacts to backcountry campsites resulting from overnight use. Analysis of data collected from BCIAMS gives park managers information about the changing conditions of backcountry campsites due to repetitive and increased visitor use. This data can then be used in developing standards that would help determine group size limitations, campsite closures or relocations, wood fire use limitations, and rerouting and maintenance of trails around campsites (Connors and Konz, 1989).

Backcountry overnight use by campers began to increase in Rocky Mountain National Park in the 1960's and peaked in 1977 (Sweet, 1997). Backcountry camping in the park is now less than it was in 1977, but more than in the 1960's.

Cole (1992 and 1994) found that degradation to vegetation and soils in campsites increases rapidly during the first 2-5 years of use (the development phase). Campsites do not grow in size indefinitely and they eventually reach a spatial limit (Cole, 1992). Cole (1994) predicted that after 3-5 years, campsites reach a state where resource damage increases as a slow rate, which he refers to as the dynamic equilibrium phase, and we will refer to as the mature phase (Figure 1).

Cole predicted that campsites in the mature phase of dynamic equilibrium (older than 3-5 years) fluctuate in the state of their degradation by 10-20% per year indefinitely,

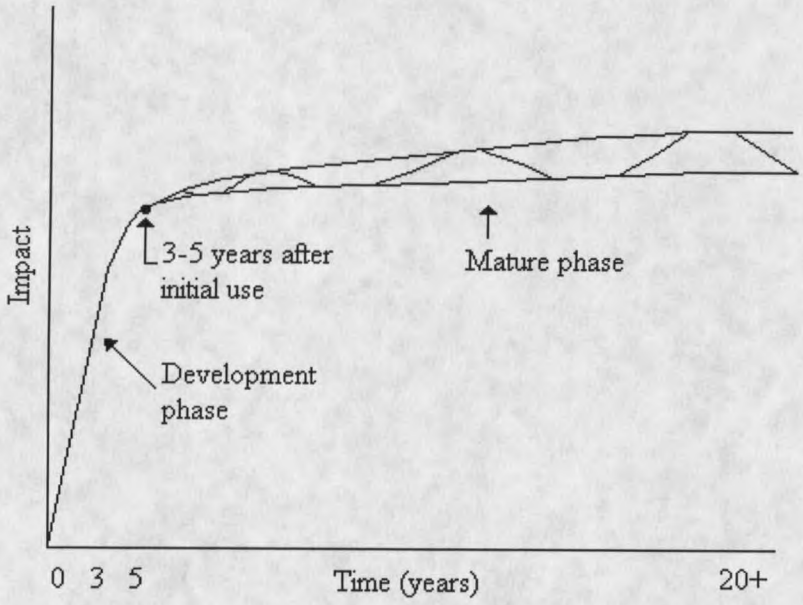

Figure 1. Life cycle of a campsite based on predictions of Cole (1992 and 1994).

if use characteristics remain the same (Cole, 1994). Campsites in the park appear to have degraded significantly in the first 3-5 years, followed by continuing resource damage of 10-20% in subsequent years (Figures 2, 3 and 4). In this study we will determine if campsites in Rocky Mountain National Park follow Cole's model, or if the resources in campsites are changing in a different manner.

The main objective of this study was to find out how increased visitor use and the geographical characteristics of campsites interact to cause changes in campsite area and in the condition backcountry campsite resources over time. The following main

Figure 2. Fern Lake group site, 1976, the first year the site was established (Thompson River files, 1996)

Figure 3. Fern Lake group site, 1977 (Thompson River files, 1996)