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AN ANALYSIS OF A ZONE-TYPE BACKCOUNTRY  
CAMPING PERMIT SYSTEM IN  
GLACIER NATIONAL PARK

By

Robert R. Seibert

B.S., Pennsylvania State University, 1969

Presented in partial fulfillment of the

requirements for the degree of

Master of Forestry

UNIVERSITY OF MONTANA

1981

Approved by:



Chairman, Board of Examiners



Dean, Graduate School

Date

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Seibert, Robert R., MF, Spring 1981

Forestry

An analysis of a zone-type backcountry camping permit system in Glacier National Park (74 pp.)

Director: Robert Ream

This is an analysis of the Wilderness Zone backcountry camping permit system which is in effect within the Nyack and Coal Creek drainages of the Middle Fork of the Flathead River area of Glacier National Park, Montana. The field portion of the study was completed during the summer of 1976 and a second documentation of campsite status was completed during the fall of 1980. The study attempted to determine visitor compliance with Wilderness Zone regulations, their perception of the zone-type camping permit system and the physical status of both traditional and nondesignated campsites within the Wilderness Zone. A simple method, utilizing photographs, campsite maps and a visually oriented Site Condition Classification System, was applied to record campsite changes over time. It was found that users supported the zone-type camping system. However, they did not select dispersed campsites that were beyond sight of the trail. Instead, virtually all users camped in the traditional, or in several newly formed campsites. Nearly all of these campsites were readily visible from the trail. The Wilderness Zone did not disperse use nor did it reduce resource impacts. Extensive resource impacts were probably avoided because of extremely low use levels.

### Acknowledgments

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## Objectives

This study will:

1. Develop and apply a simple campsite survey method that will permit field rangers to readily monitor and evaluate general trends in resource impacts within the Wilderness Zone campsites.
2. Provide a comparison of Wilderness Zone campsite conditions between 1976 and 1980.
3. Determine the effectiveness and appropriateness of the zone-type backcountry reservation system within the Nyack and Coal Creek drainages. Study conclusions will provide the resource manager with information necessary to help make decisions regarding possible expansion, modification, or elimination of the zone-type reservation system.

## Introduction

### Location

Glacier National Park is a one million acre natural area administered by the U. S. Department of the Interior, National Park Service. The Park is located in northwestern Montana and its northern boundary is formed by the Canadian border. To the east lies the Blackfoot Indian Reservation, to the west portions of the Flathead National Forest, and to the south the Great Bear and Bob Marshall Wilderness areas.

The study area is located in the south central portion of the Park. It includes the Nyack and Coal Creek drainages which are southwesterly flowing tributaries of the Middle Fork of the Flathead River. In this area, the Middle Fork forms the southwestern Park boundary.

### Natural History

Geology and topography. The Park is located on a portion of the Lewis overthrust fault. Rock formations are primarily sedimentary in origin and consist of limestones and argillites. Parent material was deposited at the bottom of an inland sea during the Precambrian Era. Later it was uplifted, eroded, overthrust faulted and glaciated (Dyson, 1960).

Today the Park represents a classic example of Pleistocene glaciation. The "backbone" of Glacier is the Continental Divide

which runs in a north to south direction. Steep U-shaped valleys originate at the Continental Divide and radiate outward. Drainages west of the Divide, including the study area, normally receive more precipitation than the drier and windier east slope areas. Within the study area trail elevations vary from 1021 meters (3350 feet) to 1856 meters (6090 feet). Mount Stimson is the highest point at 3091 meters (10,142 feet).

Flora. The study area is noted for its moist conditions, dense undergrowth and mature, heavily forested overstory. The forests are typical of those in the northern Rocky Mountain region. Most of the study area and virtually all of its trails are within the Canadian forest zone. The Hudsonian and Artic-Alpine zones are represented at higher elevations. Overstory species composition is diverse. The most common species are Douglas-fir (Pseudotsuga menziesii), subalpine fir (Abies lasiocarpa), western hemlock (Tsuga heterophylla), western larch (Larix occidentalis), Engelmann spruce (Picea engelmannii), western white pine (Pinus monticola), whitebark pine (Pinus albicaulus), and black cottonwood (Populus trichocarpa) (Robinson, 1968).

Fauna. Glacier National Park is well known for its diversity of wildlife species. The study area contains most species commonly found throughout the other areas of the Park including the black bear (Ursus americanus) and grizzly bear (Ursus arctos) (Lechleitner, 1967). Because of the potential for bear/hiker conflicts and the

threatened status of the grizzly bear, bear management is a special concern of park management. The establishment of the wilderness camping zone was, in part, an effort to experiment with the possibility of dispersing overnight users away from trails and eliminating established campsites in an attempt to reduce bear/hiker conflicts (Martinka, personal conversation, 1976).

Fisheries. The lower reaches of both Nyack and Coal Creeks have been closed to fishing to protect spawning beds of Cutthroat trout (Salmo clarkii Richardson) and Bull trout (Salvelinus confluentus). Natural barriers along both creeks prevent the migration of fish toward the upper reaches of the water courses. Fish were probably stocked at Beaver Woman, Buffalo Woman and Nyack lakes but today all of these waters are apparently barren.

Access and trails. Access to the Wilderness Zone can be obtained by walking the 19 kilometers (12 miles) of the South Boundary trail from West Glacier to its junction with the Nyack Creek trail, or more commonly by fording the Middle Fork of the Flathead River at either Nyack or Coal Creek fords. There are no bridges in the Wilderness Zone. Users traveling the entire Nyack/Coal Creek loop must ford streams more than 20 times. Eleven of these fords are substantial crossings that can be dangerous during high water periods. Trails are often muddy, poorly maintained and brushy. Generally the trails are not cleared of fallen trees until August. Prior to this clearing, hikers must contend with hundreds

of "blow down" trees that block the trail. During severe years there have been over a thousand trees across the 64 kilometers (40 miles) of Wilderness Zone trails.

### The Wilderness Zone

During the summer of 1975 Glacier National Park officials initiated a zone-type reservation system to control backcountry camping in the Nyack and Coal Creek drainages. This represented a departure from the more stringent itinerary type reservation system which had been in effect prior to 1975, and which is still utilized throughout the remainder of the Park. Park managers hoped to offer greater freedom of choice to the backcountry visitor by allowing users to choose their own campsites, and to reduce resource impacts at traditional campsites and patrol cabins by dispersing use and eliminating certain particularly disruptive camping practices.

This experimental camping zone was called the "Wilderness Zone" and comprised 55,401 hectares (136,840 acres) of the remote and lightly used Middle Fork area of the Park. Traditionally, Park Service staffing has been light in this area and during that first summer, park managers had few opportunities to monitor the effectiveness of the Zone. This study was conceived during the winter of 1975/76 and field work began during the summer of 1976.

## Literature Review

### Backcountry Use Trends on Federal Lands

Since World War II, American involvement in outdoor recreation has grown rapidly. For example, National Forest Service wilderness use has increased approximately 11% per year during the past three decades, an increase from 250,000 visits in 1950 to over two million in 1970 (Stankey, Lucas and Lime, 1974). Similar trends exist in the national parks. In Grand Teton National Park, Wyoming, hiking use increased from 84,000 in 1969 to 126,000 in 1972 (Grand Teton National Park Backcountry Management Plan, 1973). Rocky Mountain National Park in Colorado received approximately 5,000 backcountry camper days in 1960, but by 1977 use had increased to 63,000 camper days (Rocky Mountain National Park Backcountry Management Plan, 1980). On Easter weekend in 1970, 1,200 people camped at Bright Angel Creek at the bottom of the Grand Canyon - 12 times the capacity of that campground (Behan, 1976).

User pressure has caused both physical impacts along trails, campsites and lake shores and psychological impacts among the backcountry users due to overcrowding (Lime and Stankey, 1971). In the more popular areas, the wilderness resource is threatened with destruction from the sheer numbers of visitors. In short, wilderness users are literally destroying the very resource they were coming to enjoy.



## Federal Land Management Agency Mandates, Objectives and Plans

Federal land management agencies operate under organic acts which mandate management actions to protect the wilderness resource. For example, the National Park Service Act of 1916 stated the purpose of these parks

... is to conserve the scenery and the natural and historic objects and the 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.

The Wilderness Act of 1964 described wilderness as areas " ... untrammeled by man ..." with "... outstanding opportunities for solitude ..."

Legal authority for resource management agencies to take the necessary actions (later interpreted to include mandatory permits and reservations) to protect resources under their administration is given in the Code of Federal Regulations 36 C.F.R. Section 251.72 for the Forest Service and 36 C.F.R. Section 2.6 for the National Park Service. Independent Park Service study commissions reaffirmed these mandates. In 1963, the Leopold Report stated

As a primary goal we would recommend that the biotic associations within each park be maintained, or where necessary recreated, as nearly as possible in the condition that prevailed when the area was first visited by the white men. A national park should represent a vignette of primitive America... and ... above all other policies, the maintenance of naturalness should prevail.

In addition, many areas had existing master plans similar to that of Glacier National Park's whose plan stated "The primary objective of the master plan is to maintain the aesthetic

experience and to preserve the resource that makes it possible."

(Draft Environmental Statement July 23, 1973). Also

A prime consideration will be to maintain the serene wildland character of the Park, while still providing an outstanding experience for both the general vacationer and the backcountry enthusiast. (Preliminary draft, Master Plan, Glacier National Park, 1972).

### Evolution of Backcountry Reservation Systems

Wilderness managers began to realize that some type of use restrictions would be required to maintain resource quality in the more popular backcountry areas. In 1973, the President's Advisory Panel noted that some method of controlling wilderness use must be adopted to maintain use levels within reasonable limits. The panel even stated that unless such controls were adopted, the panel could not support further additions to the National Wilderness Preservation System "... since in a relatively few years, overuse could destroy ..." the area's "...wilderness character." Researchers discovered that people first experiencing wilderness under the heavier use conditions perceived conditions to be "like wilderness ought to be," but long time users felt that the heavier use decreased wilderness quality (Bradt, 1964). A concern began to surface that

If we orient wilderness management along a line designed to accommodate gradually less demanding tastes, we will probably find that a visitor population 20-30 years hence does, in fact, hold a less demanding concept of wilderness. (Stankey, 1971).

Even as early as 1942, Leopold wrote in Wilderness Values

In measuring the value of recreation, we are so obsessed with the numbers who now participate that we have forgotten all about the intensity or quality of their experience ... From now on it is quality, not quantity, which needs the attention of far-seeing administrators.

In addition, findings from visitor perception research indicated "clear and unequivocal negative reaction" of backcountry users to signs of obvious overuse. In one study, 98% of those users indicated they would not be satisfied with signs of heavy overuse in campsites (Stankey, 1971).

Wilderness managers and researchers adopted the term "carrying capacity" to designate the level of use an area could sustain without causing a permanent or unacceptable change in the area's quality and/or biotic environment (Wagar, 1964; Burden and Randerson, 1972). In 1964, Wagar noted that carrying capacity must ultimately depend upon rather subjective value judgements, usually on the part of resource managers.

Backcountry use restrictions began to evolve as early as 1958 when Sequoia and Kings Canyon National Parks used limited camping restrictions in an attempt to reverse human and stock impact in selected backcountry areas. In 1966 the U.S. Forest Service required mandatory permits in the Boundary Waters Canoe Area in Minnesota. Then in 1968, Rocky Mountain National Park established designated backcountry campsites. The following year the 34,718 acre San Geronimo Wilderness area announced that trampling, stream pollution,

noise, vandalism and congestion were so prevalent that the agency was "planning to establish a reservation system" (Arno, 1971).

In 1972, Secretary of the Interior Rogers Morton publicly announced that as a result of excessive visitation and the resulting damage to resource values, public use in certain National Park Service backcountry areas would be restricted. Several authors urged managers to begin limiting backcountry use in certain areas (Fradkin, 1971; Arno, 1971; Stankey, 1971; Lucas and Hendee, 1973).

Five different methods of rationing use have been identified and described (Stankey and Baden, 1977). They include rationing by merit, price, queuing, lottery and advance reservation. Virtually all backcountry rationing systems in use today utilize some variation of the advanced reservation system. Often these reservations are split to allow a percentage of advanced reservations with the remaining reservations issued on a first come, first served basis. Lengthy delays and waiting periods at permit issuing centers can also exert a queuing effect upon potential backcountry users who are unwilling or unable to wait one or more hours for a camping permit.

The new reservation systems offered a number of advantages to both the public and the management agencies. Registration required some type of personal contact between the wilderness user and the agency. Regulations, information and special safety notices then could be distributed to users. The agency could collect accurate visitation data, exert better control and, if appropriate,

redirect visitors from the more heavily used areas to the less heavily used areas. Backpackers could be assured a place to camp and could usually expect less crowded conditions. Of course the system added extra administrative costs to the managing agency. It also cost the visitor in terms of inconveniences in obtaining the permit and reduced freedoms once in the backcountry.

Studies showed that of all the available control techniques, reservation systems received the most acceptance from wilderness users (Lucas, 1970; Stankey, 1973). Results from other studies have shown that the initial fear that the public would not accept mandatory permits and reservations was unwarranted (Hendee, *et al.*, 1968; Lucas, 1970; Stankey, 1971; Hendee and Lucas, 1973; Fazio and Gilbert, 1974). Stankey found that most people turned away or diverted to another camping area felt that rationing was unfortunate, but necessary to protect the wilderness resource. By 1979, 45 National Park Service areas required backcountry permits.

Various types of advance reservation systems evolved, each of which imposed different types of restrictions upon the backcountry visitor:

1. Trailhead quota system - users could camp almost anywhere along a specified trail or drainage once they obtained a permit to enter at that trailhead.

2. Zone system - users could camp almost anywhere within a designated area. The area was normally of smaller size than the area controlled by the trailhead quota system. Both of the above systems often required specific campsite selection criteria such as certain minimum distances from water, trails and lake shores, and campfire restrictions.

3. Designated campsite system - users were required to camp at specific designated campsites on specific days.

Within National Park Service areas in the northern Rocky Mountains, reservation systems generally developed around designated campsites. In this way the agency imposed direct controls upon the users from the time they entered the wilderness until their exit. This was the most restrictive and heavy handed of the reservation systems.

#### Backcountry Users' Perception of Wilderness

Various workers have investigated which specific wilderness qualities seem most important to wilderness users. They have discovered privacy in one's campsite to be more important than when traveling on the trails. Encounters with large parties were more disruptive to users' perception of wilderness quality than small parties (Stankey, 1971). Nearly everyone expressed dissatisfaction with seeing obviously overused and abused areas (Lime, 1977). Most users indicated they wanted the freedom of opportunity and limited interference with their activities (Merriam and Ammons,

1968). A study within Glacier National Park concluded that clustered backcountry campsites not only detracted from the wilderness experience, but also promoted problems with human waste disposal and bear depredations (Merrill, 1978). Other studies showed that difficult access and few encounters with people were important to user's perception of wilderness (Bradt, 1964). However, many users preferred a few encounters with other people to none at all (Lucas, 1978). Finally, users were found to be less supportive of backcountry facilities and developments than many managers expected (Hendee and Harris, 1970).

#### The Backcountry Reservation System in Glacier National Park

The designated campsite system was adopted in Glacier National Park in 1973. The system and Glacier National Park itself were eventually singled out and cited as an example of excessive agency control over its backcountry users (Merriam and Knopp, 1976). This criticism plus user perception research that showed freedom of choice and spontaneity as being important to many people's wilderness experience, prompted Park managers to examine the possibility of a limited and experimental zone-type reservation system. Such a system would permit dispersed, nondesignated site camping and allow users to travel at their own rate and to select their own campsites. Resource managers at Glacier Park felt that a dispersal-type camping system would not work in heavily used drainages with attractive lakes because most campers would tend to concentrate

at those lakes rather than dispersing their sites throughout the drainage (Robert Morey, personal communication, 1974). In 1975, the Park established the Wilderness Camping Zone within the Nyack and Coal Creek drainages. This area offered certain characteristics that were likely to contribute favorably to the user's wilderness experience and the administration of the experimental system:

1. Access is difficult and normally requires fording the Middle Fork of the Flathead River.
2. Travel within the area is very demanding - no bridges, numerous stream crossings and brushy, poorly maintained trails.
3. This combination of access and travel difficulties virtually eliminates all day users from the area.
4. High water levels from the spring snow melt generally keep users from the area until mid-to late summer, thereby allowing the ground to dry before camping pressures begin.
5. Lakes within the drainages are barren of fish; therefore they serve as less of an attractant and focal point for users.
6. Traditionally, visitation levels have been very low.

In short, the Nyack/Coal Creek drainages seemed to offer excellent opportunities for a less restrictive, dispersal-type of backcountry camping permit system.

Campsite selection criteria were distributed to Wilderness Zone users when they obtained the backcountry use permit. No more than 22 parties can use the Zone at any one time. Users can camp anywhere in the Zone as long as they:



1. Use self-contained stoves - no wood fires are allowed.
2. Camp - Beyond sight of the trail
  - At least 10 meters (35 feet) from streams or lakes
  - At least one kilometer (.6 mile) from a patrol cabin
  - Away from meadows
  - A maximum of three nights at any one site and a maximum of six nights within the Zone.
3. Dispose of human wastes away from water sources.
4. Pack out all garbage.
5. Obtain special permission from the Superintendent for any group larger than 12 people.

Stockmen are required to camp at one of three designated campsites (Thompson Creek, Marthas Basin Junction, or Elk Creek). For 1980, backpackers who wished to build an open fire could also camp at these designated campsites.

#### Resource Impacts at Backcountry Campsites

Advocates of dispersal camping claim it can reduce serious resource impacts by spreading visitor use over a large area, thereby eliminating or at least reducing concentrated use. However, instead of a limited number of designated campsites receiving all of the impact, a dispersal system may also create a proliferation of campsites that receive relatively light use. Findings indicate the impact of trampling on ground vegetation and soil in a specific site is most severe during initial light use and that more

use causes relatively little additional change (LaPage, 1967; Frissell and Duncan, 1968; Merriam and Smith, 1974; Young, 1978). Frissell and Duncan (1965) discovered that campsites in the Boundary Waters Canoe Area which were occupied 61-90 days per season lost 87% of their ground cover, while other sites used less than 30 days per season still lost 80% of their cover. Similar results have been recorded in other studies (Young, 1978). However, vegetation changes may stabilize after the first two years of use (LaPage, 1967; Merriam and Smith, 1974). It has also been shown that vegetation recovery rates can be many times slower than the deterioration rates (Merriam and Smith, 1974). Unless all use is eliminated from a campsite, there seems to be little hope of vegetation and soil recovery (Will<sup>and</sup> and Marr, 1971). Bradt (1964) recommended that wilderness campsites be rotated to allow for their recovery, but the previously cited research does not support rotation as an effective tool in campsite management. Ranz (1979) studied the effect of campsite closures and found that the effects of closing campsites were less pronounced than the effects of campsite developments because: (1) all visitors did not comply with the closure; (2) ecological damage occurred elsewhere in the form of newly formed campsites and (3) recovery was slow relative to the time it took the damage to occur.

In a study of a dispersed camping zone in the Great Gulf Wilderness Area of New Hampshire, users were requested to camp in areas that showed no prior use. Even though abundant sites existed,

campers failed to locate and establish new sites. Ninety-five percent of the sites users selected showed clear signs of previous use and six of the most heavily impacted sites received 81% of the use (Canyon et al., 1979).

Cole (1981) has argued that use dispersal will do little to alleviate campsite impact and will likely increase the number of impacted sites.

Brown and Schomaker (1974) established physical criteria for potential wilderness campsites. During field surveys, they identified the basic physical features campers seemed to require of a site before they would camp there. They identified a functional campsite as one which meets the following criteria:

1. a minimum of 400 square feet of level area (4% slope or less);
2. within 500 feet of water;
3. dry tent pad area;
4. has visibility of a lake or stream; and
5. within 750 feet of firewood (not valid where mandatory wood fire restrictions exist).

Obviously for dispersed nondesignated site camping to be successful, sufficient functional sites must exist and be evident to the users to allow them to disperse themselves.

Studies also have shown that campsite deterioration is not necessarily related to the intensity of the use it receives. Other factors such as slope, soil texture, moisture content and vegetation

types appear to exert a greater influence in determining site impact than intensity of use (LaPage, 1967; Merriam and Smith, 1974). For example, Cole (1979) discovered that in the Eagle Cap Wilderness Area of Oregon, meadow vegetation usually showed less damage from trampling than the understory vegetation in adjacent forests. Dale (1973) noted similar results in Montana's Madison Range. Magill (1970) and Merriam and Smith (1974) found evidence that overused appearances within intensively used campgrounds may only be superficial and that some ecosystems can, to a certain degree, adapt to trampling and human impact.

Other studies have identified indicator plant species that tend to either increase or decrease in relative abundance with various levels of trampling (Burden and Randerson, 1972; Dale, 1973; Dale and Weaver, 1974; Helgath, 1975; Coombs, 1976; Hartley, 1976). Helgath (1975) related trail deterioration to vegetative habitat type, land form and slope in the Selway-Bitterroot Wilderness of Idaho and Montana.

Campfires were found to lead to increased trampling as users search for firewood. Burning the dead and downed woody material also disrupts the nutrient recycling within the ecosystem (Dale, 1973).

The type of use also affects impact levels. Horse parties in particular have been found to create larger campsites with higher percentages of bare ground than backpacking parties (Frissell, 1973; Brown and Schomaker, 1974).

Cole (1979, 1981) emphasized the importance of locating campsites in permanent locations that were selected to minimize the effects of "undesirable change" due to trampling. He supported dispersal of these permanent sites to increase the user's opportunities for solitude. In 1978 Merrill found, in Glacier National Park, that campgrounds without large party limits and those with high site deterioration are locations where bear incidents are most likely to occur.

#### Documentation of Resource Impacts at Backcountry Campsites

Virtually any amount of recreational use will cause some amount of resource change. Frissell and Stankey (1972) emphasized the importance of identifying the "limits of acceptable change," that is, the amount of physical change from pristine conditions an area can experience and still remain within the management objectives set for that area by the resource managers.

Over the years numerous methods have been used to document campsite and trail conditions. Usually the purpose of such documentation was to record aesthetic and/or biological changes resulting from user impacts or to record the progress from vegetation restoration efforts or campsite closures. Workers have attempted to quantify the effects of trampling by establishing plots each of which was artificially trampled a given number of times (Cieslinski and Wagar, 1970; Palmer, 1972; Bell and Bliss, 1973). Others have sampled specific campsites (LaPage, 1967; Merriam et al.,

1973; Brown et al., 1977; Young, 1978). Normally these workers measured vegetative ground cover utilizing sampling grids, hoops or transect lines. These studies, while providing accurate quantitative data, have proven to be very expensive and time consuming. As an example, in 1975 Lucas and Ream submitted a study proposal designed to "describe the nature and degree of visitor environmental impact on campsites and trails ... of the Selway-Bitterroot Wilderness over a six year time span." Cost estimates in 1976 totaled \$26,668. Such expenditures of time and money are becoming increasingly difficult for most resource managers to justify. In addition, these intensive studies usually cover only a small portion of any given wilderness area.

Other methods of documenting resource impacts are available. Generally they are less complex, more qualitative than quantitative and show general trends and measure the more gross ecological changes. Such methods offer certain significant advantages to the resource manager.

1. The documentation can be carried out by field rangers during their normal summer patrols rather than by specialized researchers.
2. Many more sites can be documented during a given period of time utilizing less complex methods of evaluating site conditions.
3. Future site comparisons can be made quickly by reference to general site characteristics rather than having to repeat plant census methods.

A number of workers have utilized photographs as a means of documenting resource impacts. Croft and Ellison (1960) used a combination of close up, general site and panorama photographs to document range and watershed conditions in the Yellowstone and Teton area. Magill and Twiss (1965) described methods and benefits of establishing permanent camera points for long term studies. Walker (1968) incorporated stereophotogrammetry as a tool to obtain accurate vegetative measurements. His study failed to provide results from which accurate vegetative measurements could be obtained; however, it did show that general site trends could be documented. LaPage (1965) also did not obtain satisfactory quantitative measurements with respect to species composition and percent of vegetative coverage. In personal communications with David Cole, research ecologist at the Forestry Science Laboratory in Missoula, Montana, Mr. Cole said that photography provides an excellent method of monitoring gross changes on sites over time. However, it is less useful in determining quantitative and detailed data. Rinehart and others (1978) met with some success in measuring trail conditions, especially trail entrenchment, using stereo photography to record trail cross-sections from permanent camera points.

Hendee and others (1976) developed Code-A-Site, a system designed to inventory campsites and enable managers to monitor changes in those sites. It can also be used to monitor the creation of new sites over time. The system was designed to be easy to use and to provide basic site-oriented descriptive information.

In 1970 Ketchledge and Leonard devised a four-stage inventory and evaluation scheme which described degrees of trail erosion in the Adirondack high country. Each of the four stages were based upon visual indicators of impact. Thus, a trail segment could quickly be rated as to its general condition, and at a later date, be rated again. Gradual but significant changes in the condition of the trail could be identified despite the turnover of agency personnel.

Frissell (1978) developed a similar visual judgement system which he called Site Condition Classes. Campsites were rated from one (minimal physical impact) to five (extensive vegetative damage). Rating criteria for each Condition Class were based upon changes that might be noticed by the average visitor and thus influence that visitor's perception of the campsite and their camping experience. Frissell noted that these visible changes (loss of vegetative ground cover, root exposure, erosion, tree mortality, etc.) probably also indicated less obvious changes in soil compaction, soil moisture, root aeration and other physical factors. Researchers at Sequoia and Kings Canyon National Parks developed a rapidly applied visual system to measure impact over a large area with numerous non-designated campsites (Parsons, 1980). Another, but more time consuming, method of visually evaluating campsites was developed for use in Great Smokies National Park (Bratton et al., 1978).



## Study Methods

### Contacting Wilderness Zone Users and Locating Their Campsites

During the Summer of 1976, data were collected and users were contacted while on patrol as a seasonal backcountry ranger assigned to the Walton Ranger Station and during extensions of these patrols on lieu days. A second photographic documentation was completed during the Fall of 1980.

Random checks were made of the access and departure points people indicated they would use when they obtained their permit. If their permit showed they had a vehicle, it was possible to confirm their presence in the Zone.

User compliance, preference and campsite location data were obtained during these backcountry patrols by:

1. encountering users while in camp;
2. encountering users while on the trail and determining past campsites by their verbal description;
3. examination of sites visible from the trail which showed evidence of overnight visitor use;
4. exploring areas that seemed to offer suitable campsite opportunities, e.g. level tent site, water availability, etc., in an attempt to locate undesignated sites that were not readily apparent from the trail; and
5. encountering some users at the trailheads or the Walton Ranger Station following the completion of their trip.

Initial campsite use was readily determined by the presence of "sleeping beds" which showed flattened vegetation in the nondesignated sites. Designated or traditional sites which had little ground cover were "laced" with branches and rocks to require moving of these items to facilitate overnight camping. This enabled a rough and, at the very least, a minimum estimation of the use each site was receiving. While this method could not quantify the exact numbers of users or even parties utilizing the site during any one period, it was effective in determining if the site was used between survey periods. Thus, it was possible to determine which sites were receiving repeated use and relate this to site deterioration. It was also possible to estimate the percentage of users who were choosing campsites which conformed to the Wilderness Zone requirements.

A set of preselected verbal questions were asked of each party encountered that was using or had used the Wilderness Zone. These questions were utilized to show general indications of:

1. why users chose the Wilderness Zone;
2. user satisfaction with the Wilderness Zone;
3. user compliance with Wilderness Zone regulations.

Specific questions are listed in Appendix D.

The term "nondesignated campsite" refers to the newly created campsites that developed as a result of users selecting dispersed campsites. "Traditional campsites" describes sites that developed from historical use prior to the establishment of the Wilderness Zone.

### Campsite Documentation \*

Both traditional and nondesignated campsite conditions were documented by each of the following methods:

1. Site map was prepared for each campsite. The map showed:
  - a. campsite location and orientation with respect to trails and other physical features;
  - b. sketch of the campsite and area of impact;
  - c. fire pits;
  - d. permanent camera point.

Each campsite was also located on a U.S.G.S. topographical map.

2. Site description data recorded:
  - a. verbal description of site location.
  - b. elevation
  - c. whether it was a nondesignated or traditional campsite
  - d. habitat type
  - e. percent ground cover within the campsite (estimated)

3. Site Condition Class: Frissell's (1978) classification system which is keyed to visual changes in the physical campsite condition. Six Site Condition classes were used:

- 0 no indication of use
- 1 ground vegetation compressed temporarily but not seriously injured, minimal physical change, possible small fire ring
- 2 ground vegetation worn away in the immediate center of the site only

\* A complete set of campsite documentation is on file at Glacier National Park, West Glacier, Montana.

- 3 ground vegetation gone throughout most of the site, humus and organic litter still present in most places
- 4 bare mineral soil is widespread, tree roots are exposed on campsite surface
- 5 ground cover is almost non-existent, trees may be dying, obvious soil erosion occurring

4. Permanent camera point was established using a natural feature, or an orange plastic tent stake driven flush with the ground level. Camera points were referenced by magnetic azimuths and horizontal distances from two permanent natural features. Walker (1968) established camera points in the center of the impact area. During this study, camera points were located at one edge of the impact area so that the portion of unphotographed area immediately under the camera and tripod would be out of the actual campsite.

5. Stereo pair photographs utilizing a 2 1/4 x 2 1/4 inch format Nortia single lense reflex camera equipped with a 40 millimeter wide angle lens were made of the camera point location and major points of site impact. Photographs were mounted on 3 x 5 inch index cards for easy field use with a pocket stereoscope.

6. 360<sup>0</sup> panorama photographs utilizing the same 2 1/4 x 2 1/4 inch camera and lens were taken from the established camera point. The spliced composite panorama was mounted on poster board to facilitate future field reference. Both stereo pair photographs and panoramas were contact printed on glossy "F" finish resin coated photographic paper which is resistant to finger printing and water spotting.

### Research Efforts

During 1976, all or part of the 34 days were spent in the Wilderness Zone in an effort to locate and document nondesignated campsites and contact zone users. Photographic site documentation also was completed during this period. In September 1980, 5 additional days were spent examining both the old 1976 sites and sites established since 1976. These sites were photographed, mapped and classified by the same methods used in 1976.

## Results

### Difficulties Encountered

1976 field season difficulties primarily evolved around forces of nature. Intense wind storms during the Fall of 1976 and Spring of 1976 caused an unusually high number of "blow-down" trees across many of the Park's trails. The Wilderness Zone was particularly hard hit, including a major "blow-down" area between the lower and upper Nyack cabins. This presented a major obstacle to the back-country traveler and resulted in the Wilderness Zone being listed in a "not recommended for visitor travel" classification. While this did not prohibit visitor use, the visitor center information aides usually discouraged prospective users from scheduling a trip into the Wilderness Zone. In addition, 1976 was the first year of the exclusive use of non-mechanized trail maintenance equipment. While the contract and park trail crews performed admirably, the use of crosscut saws and the increased work load from fallen trees delayed the "official" opening of the Wilderness Zone until the latter part of August.

Furthermore, the Summer of 1976 was one of the wettest in Montana's history. Many prospective users were undoubtedly discouraged by warnings of wet, brushy, muddy conditions and by the restriction prohibiting campfires that is in effect for the entire Wilderness Zone. As a result, data were collected from a relatively small group of users during a short period of time.

### Visitation

The communications center of Glacier National Park keeps detailed records of backcountry permit holders. A complete listing was obtained of all permits issued for the Wilderness Zone between July 20 and September 5, 1976. The records show 54 parties obtained permits for some portion of the Wilderness Zone. From checking trail heads and early excursions into the Zone, 16 parties were added to account for users obtaining permits prior to and after my records began and ended. Therefore an estimated 70 parties obtained backcountry camping permits for some portion of the Wilderness Zone. The average party size was 1.75 persons for an estimated 123 persons who registered for Wilderness Zone permits.

No specific records were kept while checking trailheads for permit holders' vehicles. However, it was obvious that a substantial portion of them did not make their scheduled trip, especially during rainy periods.

During my travels 17 parties were contacted. This represents 24% of the persons who obtained permits for the Wilderness Zone. These parties consisted of 32 persons (26% of the estimated Zone users). Of the parties contacted, three were cancelling their trip after the first day and one never left the trail head. Since quite a few other parties probably never left the trail head, it is likely that more than 26% of the people who actually used the Wilderness Zone were contacted.

Wilderness Zone use has remained relatively constant. In 1976 the average user stayed in the Zone 4.3 days for a total of 519 user nights. 1977-79 data were not available, but there were 505 user nights in 1980. (See appendix E).

#### Nondesignated Campsite Availability and Selection

Generally, the Wilderness Zone's rugged topography and dense vegetative ground cover do not provide the basic characteristics which have been identified as necessary for a good or even acceptable campsite (Brown and Schomaker, 1974). Inventories of the Wilderness Zone show that unused, nondesignated campsites that conform to all campsite selection criteria are available but are not abundant. It is apparent that users are either not capable of, or not motivated to seek out these sites. This supports 1979 findings from Canon and others that campers seldom utilize opportunities to practice truly dispersed camping skills. In all fairness to Wilderness Zone users, the physical characteristics of the area greatly limit the availability of attractive campsites. This, combined with rigorous travel conditions, seem too much for most of the Zone users. At the end of a hiking day they are simply too tired to actively search the rugged terrain in hopes of finding a campsite that meets the selection criteria. Instead they camp at sites they can readily identify from the trail.

#### Campsite Status and Conditions

In 1976 a total of 23 sites were identified as camping locations. These included eight traditional sites such as the cabin, Marthas Basin



Junction and both Buffalo Woman and Beaver Woman lakes, plus 15 new nondesignated sites. Thirteen campsites were evaluated as Site Condition Class (SCC) I sites (compressed vegetation but minimal physical change), six as SCC II sites (vegetation worn away at the center of the site), three as SCC III sites (vegetation gone throughout most of the site), and only one SCC IV site (bare mineral soil widespread with exposed tree roots). No SCC V sites (soil erosion and no ground cover) were identified. Of the 10 sites that showed significant impact (SCC II or greater), six were traditional sites and one was in sandy soil, where the main ground cover was horsetail (Equisetum sp.). This sandy site showed little evidence of use but the fragile horsetail was eliminated from the center of the site which rated it as SCC II. Therefore, only three new sites actually received enough use to show significant change in 1976.

In 1980, an additional three new campsites were identified. Two were SCC I and one was SCC II. However, nine of the 23 sites from 1976 improved sufficiently to decrease their SCC rating. Seven of the original 15 nondesignated campsites discovered in 1976 showed no sign of use and, at least visually, had returned to a SCC of 0. Therefore, the total number of identified campsites dropped from 23 in 1976 to 19 in 1980. The total number of new nondesignated sites showing "significant impact" increased from three in 1976 to four in 1980, but none showed deterioration greater than SCC II.

The decrease in the total number of campsites between 1976 and 1980 was probably a result of the multiple 1976 surveys that were more intensive and counted nearly all of the "one time use" campsites. The single September 1980 survey was as complete as possible but it could have missed some "one time use" campsites that had recovered by natural growth processes. Nevertheless, the total number of Wilderness Zone campsites did not increase during the four-year period.

All of the campsites that improved to a SCC 0 by 1980 were SCC I sites in 1976. A 1976 SCC III site created by a Park Service trail crew camp improved to a SCC II site in 1980. But, this site was used for only one intensive period during 1976 and appeared to have received little or no use during the years between surveys. It seems that favorable growing conditions enable campsites which are used only a few times (impact not to exceed a SCC I) to complete what appears to be a rapid and total recovery.

1976 sites that received repeated use in that year and all of the traditional campsites remained unchanged in their assigned SCC rating. This supports Willard and Marr's 1971 findings that all use must be eliminated from a campsite before vegetation recovery will occur.

Site impact, even within the most heavily used traditional campsites, is not severe. In 1980 only one site rated a SCC IV and only two rated SCC III. Nowhere was severe erosion or obvious tree mortality occurring. None of the 1976 sites increased in SCC rating during the four years between surveys.

It seems reasonable to conclude that at current use levels, excessive resource impacts are not occurring within the Wilderness Zone. However, the Wilderness Zone camping system is failing to disperse use beyond sight of the trail and reduce resource impacts. Not only are the traditional campsites receiving sufficient use to prevent their vegetative recovery, but four other nondesignated campsites have developed. Virtually all campsites have been located within the visual trail corridors.

Park Service contract trail crews and special brushing crews created four of the 14 new campsites within the Wilderness Zone. All of these sites were adjacent to and visible from the trail. Two of these have now developed into regularly used campsites. Two of these sites were SCC I, one was SCC II and one was SCC III. The trail crews often occupy their campsites for several days at a time, may be supplied by pack stock, and have the potential of causing extensive impact, especially during wet weather. Several campsites have sustained damage from stock being tied to trees.

#### Resource Documentation

Of the 23 sites identified in 1976, 18 were documented with photographs and site maps. The remaining sites were extremely undesirable with respect to water availability or rough topography. They were probably used by exhausted hikers and the likelihood of others using these sites seemed extremely low. Indeed, of the five sites not documented with photographs in 1976, not one showed signs of use in 1980.

Only two of the three new sites for 1980 were photographed. The third one was at Elk Creek Park <sup>where</sup> personnel were in the process of installing three new designated campsites.

#### User Compliance with Basic Wilderness Zone Regulations

When prospective Wilderness Zone users obtained their camping permit, they agreed to abide by the following set of guidelines which would determine where they could and could not camp.

Users must camp beyond sight of the trail. In this area, the effectiveness of the zone system completely breaks down. Of the 26 campsites identified within the Wilderness Zone, 25 were readily visible from the trail; 17 were within three meters (9.8 feet) of the trail. The 1976 survey of visitor perceptions did not identify this as a problem to Wilderness Zone users. However, use was especially light in that year. Trail side camping may have a social impact upon certain users and could become more significant if use continues to increase. In-camp encounters with hikers must be expected. This type of meeting has been shown to be the most disruptive to camper's wilderness experience (Stankey, 1971).

Bears are known to travel on the established trail systems (Jonkel, 1975). If Zone campers are selecting their campsites on and adjacent to trails, it could increase the potential for bear/people encounters. Under certain wind conditions, the potential may exist for bears to unknowingly approach and even enter campsites. In 1976, a user selected a nondesignated campsite along the Cut Bank

Pass trail between the Nyack trail and Cut Bank Pass. While the camper was preparing dinner, an adult grizzly walked down the trail and into the camp. The camper climbed a tree and watched the bear pause to dine on beef stew before continuing down the trail. It seems reasonable that such encounters would be less likely if campers were dispersing themselves away from and beyond sight of the trail. All users were aware they should hang their food at night and most were following this practice.

No open fires. In 1976, seven campfire rings were discovered in the Wilderness Zone. Four were located in the traditional campsites and in pre-existing fire scars. Two were built in the middle of the trail tread and were obliterated by hiking pressure by the end of the season. Therefore, during 1976, only one new fire scar was created. That seems a fine record considering the wet and brushy travel conditions which likely increased users' desire to build fires to dry their clothing and equipment.

It is difficult to compare 1980 with 1976 since Park employees broke up fire rings during their normal patrols. I discovered evidence of three fire rings on my survey. One of these was a new fire scar along Coal Creek. Only one of the cabins showed any evidence of a campfire - the lower Nyack cabin. The fire pit I had restored at the Upper Nyack cabin in 1976 showed no sign of use and in 1980 had completely revegetated.

Campsites must be at least 10 meters from streams or lakes.

Most campsites met or exceeded the 10 meter from water requirement. However, the most intensively used designated campsite, Marthas Basin, is less than 10 meters (35 feet) from Coal Creek.

Campsites must be at least one kilometer away from patrol cabins.

All three patrol cabins received use from at least one hiking party during 1976. However, vegetative ground cover remains complete at all three cabins except for the traditional tent pads at the lower Nyack cabin. The rain protection offered by the porch roofs will probably continue to lure some hikers into disregarding this regulation. However, there is no indication that resource damage is occurring at current use levels.

Campsites to be located beyond sight of other parties. Visitor use within the Wilderness Zone is so light that this regulation seems to cause no problems. Only one of the 17 parties contacted in 1976 said they had another party visible while camped at night. In this case, both parties camped late and were tired. The party questioned indicated that since they saw no other users while on the trail they really didn't mind the proximity of the two camps.

Users should not camp in meadows. Only two nondesignated sites were located in meadows. The dry, extensive meadows north of the old Nyack Ranger Station showed virtually no impact from a single site located there. This supports Cole's (1979) findings that dry

meadow vegetation can be especially resistant to trampling. The damp meadow along the shore of Beaver Woman Lake was used in 1976 by one party and had shown signs of limited use during the 1980 survey. Other than a fire ring, this site shows little evidence of damage. However, the potential for impact is greater there because of damp site conditions.

Users may camp a maximum of three nights at any one site and no more than six nights in the Wilderness Zone. No users stayed longer than two nights in any single site. Marthas Basin Junction and Beaver Woman and Buffalo Woman Lakes seem to be the only locations that are likely to attract users for more than one night.

#### Visitor Understanding of Backcountry Bear Avoidance and Sanitary Camping Practices

In 1976, 23 visitors encountered in, or following their departure from the Wilderness Zone, were questioned as to what they were doing with their garbage, their food while camped at night, and their human wastes.

1. All visitors said they were packing their garbage out of the backcountry. Indeed, very little litter was discovered during 1976 patrolling efforts.

2. Twenty-two of the users said they were hanging their food in trees at night. Only one individual admitted to leaving the food in his tent. This person claimed to know better, but by his own description "was lazy."

3. Twenty of the users said they were burying their human wastes away from camp and water supplies, one said he preferred to "do it like the bears" and forego both burying and toilet paper, and two said they stayed away from water sources but did not bury their excrement.

### Visitor Perception of the Wilderness Zone

The following data were collected during the 1976 survey. Some visitors were not asked certain questions due to the conditions of the encounter (e.g. it was or began raining or the user seemed reluctant to answer). Thus different questions have different numbers of respondents.

User approval of the wilderness zone concept. All 23 users expressed approval with the general concept of dispersed camping systems.

Public demand for a wilderness zone-type reservation system. Users were asked to select from the following questions those which best described their reasons for choosing the Wilderness Zone. Twenty-three persons responded with the following results.

1. Fifteen (65%) wanted the greater freedom of the zone reservation system.
2. Nineteen (82%) hoped to avoid more populated areas of the Park.
3. Eight (35%) felt there was no room in other portions of the Park.



4. Nine (39%) chose the Wilderness Zone to avoid the hassles of planning an itinerary trip in other portions of the Park.

Most of the visitors responded to more than one of the above questions. An additional three persons indicated they chose the trip because they had hiked extensively in Glacier Park but had never had the opportunity to hike the Nyack/Coal Creek loop and wanted to see Marthas Basin.

Opportunities for selecting nondesignated campsites. When asked if they were able to locate nondesignated campsites which conformed to their camping permit requirements, 10 of 14 respondents said yes. The remaining four felt the area was too brushy, the terrain too rugged, or the one kilometer from the patrol cabin rule kept their site from complying with the zone camping regulations. This is particularly interesting since only one of the 26 sites that was discovered met all the undesignated campsite requirements.

Users were then asked if the selected sites fulfilled their own expectations of a "good" camp. Thirteen users responded. Nine said yes and four said it was too brushy and/or rough to qualify as a "good" camp.

Opportunities for privacy and solitude. The opportunities for Wilderness Zone users to find the degree of solitude they were seeking proved a problem to no one. All of the 16 respondents said they had found the degree of privacy they were seeking both while hiking the trail during the day and while camped at night.

Only one group said they ever camped within sight of another party. This also was the only time any group could hear another party while camped.

Encounters with other users while hiking varied from seeing no one to seeing eight persons (some of which were trail crew members). Of the parties I questioned, the number of persons they had encountered, not counting myself, averaged 2.6.

No campfires. Users were asked how they felt about giving up the right to build a campfire for the opportunity to select their own nondesignated campsite. Twenty-three persons responded. Five were highly favorable, 10 were favorable, seven were neutral, one was against and no one was highly against. The single negative response opposed the idea of not being able to dry out in cold, wet conditions that might promote an emergency hypothermic situation. No one seemed to really mind giving up either the cooking or the aesthetic evening campfire.

Lack of foot bridges. There are no foot bridges over major streams and rivers in the Wilderness Zone. A complete Nyack/Coal Creek loop requires users to make their own way across 11 substantial waterways plus many other smaller streams. Twenty-two users were asked how they felt about bridges, in natural or wilderness areas, over creeks where hikers would otherwise get their feet wet. No one was highly favorable, two were favorable, six were neutral, 10 were against and three were highly against. This supported Hendee and Harris'

1970 findings that improved facilities in the wilderness are not necessary or wanted. However, feelings quickly changed when these same users were asked about bridges over streams or rivers that might be dangerous or at least challenging to ford. Five were highly favorable, eight were favorable, five were neutral, three were against and no one was highly against. Users were also asked if they had encountered any locations where they felt bridges were needed. All respondents said no. It should be noted that most of these users were contacted during mid-and late August when all of the fords could be made safely and with little difficulty.

User satisfaction with assistance from Park Service personnel.

Twenty-two persons were asked if they were satisfied with the assistance and information they had received from Park personnel during the planning and implementation of their trip. Twenty indicated yes, they were satisfied. Two indicated they were not satisfied. Even those who indicated they were satisfied, occasionally would reflect similar feelings of the two users who complained about the Park's information system. The two most common complaints were

1. Too few information aides had first-hand experience with the areas for which they were writing permits.

2. Users found they could not depend upon all the information they received, especially concerning the difficult traveling conditions they would be encountering in the Wilderness Zone.

The first complaint was the most common, and seemed valid for isolated areas such as the Middle Fork drainages. The second point was made

by only a small portion of the visitors. Most of these had not taken the time to stop or call Walton Ranger Station to inquire about current conditions and/or had not been referred to the trip descriptions available at all the visitor centers. It seems that most of the surveyed Wilderness Zone users were aware of the rigors involved in traveling the trails in this area.

User compliance in obtaining valid backcountry camping permits.

Two of the 17 parties encountered in the Wilderness Zone did not have camping permits. One of these parties consisted of Glacier Park Incorporated employees who were hiking after Labor Day. They claimed to have stopped at both East Glacier and Cut Bank Ranger Station but neither was open. The other user was a Park Service employee who was also responsible for two of the seven wood fire violations and one camp at a patrol cabin. He claimed to have "heard" of the Wilderness Zone and assumed that no permit was required since specific campsites were not used. Since all this information was obtained voluntarily from the user after his trip, he must have been truly ignorant of the Zone regulations.

### Personal Observations

1. The existing traditional campsites are badly in need of relocation and restoration. This is especially true of Marthas Basin Junction.

2. In 1980, three new designated campsites were constructed along Elk Creek in the Coal Creek drainage. To reach the back site, users must walk through the first two sites. This is not uncommon throughout the rest of the Park's backcountry campsites, but it seem inappropriate for both the Wilderness Zone and the types of users the Zone seems to attract.

3. Official 1980 Wilderness Zone regulations indicated that users could camp and build campfires at two designated campsites within the Zone - Thompson Creek, Marthas Basin Junction and Elk Creek. Marthas Basin Junction is a traditional site, Elk Creek sites were installed in 1980, but no improvements have been made at Thompson Creek.

4. The present trail system leads hikers directly to both of the Nyack patrol cabins. This increases the chance for vandalism, opportunities for users to camp at the cabins and may be an intrusion into certain user's wilderness experience.

5. During 1976, no public horse mounted parties utilized the Wilderness Zone. Park personnel have indicated that private horse use within the Zone continues to be virtually nonexistent. However, over the past six years the Park Service has spent considerable

effort constructing bog bridges over extensive damp portions of the Coal Creek trail. It has been my experience that such bridges are often not needed until Park Service stock are taken into the area for construction projects during wet conditions. The repeated trampling of these moist trail segments by the pack stock quickly creates vast muddy quagmires. The more trips the packers make to deliver construction materials, the more areas form that require by bridge construction!

6. Portions of the Wilderness Zone, especially the Cut Bank Pass trail between Nyack Creek and the Pass, are not suitable for stock use. It is dangerous to both stock and riders, and damaging to the trail, surrounding soil and vegetation.

7. A portion of the trail between Surprise Pass and Martha's Basin Junction is experiencing severe erosion. It deteriorated between 1976 and 1980 and today has had "head cut" erosional gullies nearly a meter deep. In addition to the environmental damage, this short trail segment presents a hazard to travelers, especially at dusk.

8. There is a Canadian thistle patch at the southwest side of the Lower Nyack Creek cabin. This is an exotic plant species that was probably introduced through feces from stock.

## Management Recommendations

1. Complete the establishment of the three designated campsites identified in the 1980 Wilderness Zone Regulations (Thompson Creek, Marthas Basin Junction and Elk Creek). These campsites should be located beyond sight and sound of the main trails. In locating these sites, consideration should be given to providing users maximum opportunities to experience solitude in the campsite. Single sites should be used rather than the multiple sites that were constructed at Elk Creek in 1980. Multiple sites in proximity to one another will only serve to provide similar camping experiences to other Glacier Park backcountry areas. Most importantly, the sense of wilderness and solitude should prevail in the Wilderness Zone campsites.

2. The traditional Marthas Basin Junction campground should be relocated to single campsites, beyond sight and sound of the trail. If more than one site is needed, individual sites should be properly located to provide users the opportunities for solitude. Access trails to the individual campsites should not pass through one site to reach another.

3. The old traditional campsites that are readily visible from the trail should be closed to camping, relocated if appropriate, restored and temporarily signed to prevent future use during the recovery period. The signing and restoration should accompany the

relocation at Marthas Basin Junction. Ideally, the newly formed nondesignated campsites that are visible from the trail should also be closed and restored; however, caution should be used since their closure may cause new impacts at other locations. Users have shown they will likely select sites that are visible from the trail. Nondesignated campsite closures may prove counterproductive and should be accompanied by careful monitoring.

4. Park managers should carefully examine the 22 party limit currently established for the Wilderness Zone. Considering the present number of campsites which absorb nearly all the camping use and the inability of users to properly locate new undesignated sites, this assigned carrying capacity seems too high. Excessive resource damage is not occurring now, but the Wilderness Zone is not being used at its present assigned carrying capacity. Significant resource damage could quickly occur if camping pressures increase.

5. Restrictions should be established on the use of stock within portions of the Wilderness Zone. The Cut Bank Pass trail is especially unsuitable for horse travel - both for safety and resource deterioration. If Park stock must be used for construction projects, their use should be restricted to periods when the trails are dry. Packing operations should be discontinued when trail conditions become wet.



6. It was determined that "excessive" resource impacts are not occurring within the Wilderness Zone under current use levels. However, Park managers must ultimately determine just what level of resource damage constitutes "excessive" impacts. Once "limits of acceptable change" have been defined, Park managers can readily identify resource problem areas and assign realistic priorities for the correction or restoration of that area.

7. Park supervisors should emphasize the importance of proper nondesignated campsite selection to the Park and contract trail crews. Whenever possible these groups should camp at the designated campsites.

8. The Nyack trail should be re-routed to bypass the two patrol cabins. Spur trails should connect the cabins to the main trail in such a manner that the cabins are not visible from the main trail.

9. Trail maintenance is needed for a short, but severely eroded trail segment between Surprise Pass and Marthas Basin Junction.

10. The Canadian thistle patch at the Lower Nyack cabin should be eradicated. The patch is small enough that several consecutive years of plant removal (main root stalk included) prior to seed dispersal should control the situation.

## Summary

### Campsite Selection and Resource Impacts

1. The Wilderness Zone camping system is not reducing resource impact by dispersing visitor use. Instead, a few additional campsites have developed and conditions within the traditional campsites have remained essentially the same.

2. Resource impacts at both traditional and nondesignated campsites have not been excessive (generally Site Condition Class II or less), probably due to the extremely low levels of use the Wilderness Zone receives.

3. Nondesignated sites exist which conform to all the campsite selection criteria; however, because of rough topography and dense, brushy ground vegetation, they are not abundant.

4. Most Wilderness Zone users are either not capable of, or not motivated to seek out these nondesignated sites that would conform to the campsite selection criteria.

5. Nearly all users are camping at existing traditional campsites or at a few newly formed nondesignated campsites.

6. The great proliferation of nondesignated campsites feared by some people is unlikely to occur at existing use levels due to rugged topography and dense, brushy vegetation.

7. Virtually all of the nondesignated campsites that users selected have been located within sight of and most were within three meters (10 feet) of the trail.

8. Abundant moisture and favorable growing conditions enable campsites that are used only a few times (impact not to exceed a Site Condition Class I) to complete what appears to be a rapid and total recovery.

9. Trailside camping may increase the potential for bear/camper encounters.

10. Wilderness Zone users, with a few exceptions, have proven to abide by all the Zone regulations except for selecting campsites that are beyond sight of the trail.

11. The packing of lumber on Park stock to supply bog bridge construction projects in the Coal Creek drainage has created excessive damage to that trail, and has served to perpetuate those construction projects over the past six years.

12. Park Service contract trail crews have continued to establish their campsites immediately adjacent to the trails. Two of these sites have become established and now are utilized by other Zone campers.

#### User Perception of the Wilderness Zone

13. All Zone users approved of and supported the Wilderness Zone camping concept.

14. Most users chose the Wilderness Zone to avoid the more populated areas of the Park. To a lesser extent they chose the Zone for the greater travel and camping freedoms it offered.

14. The majority of users felt they had located a "good camp" that conformed to the basic campsite selection criteria. However,

when these campsites were investigated, nearly all the sites violated some aspect of the selection criteria. Usually they were visible from the trail.

16. All Zone users felt they found at least the degree of solitude they were seeking.

17. Users said they did not mind foregoing a campfire for the opportunity to select their own campsite. However, some did build fires and others expressed a concern about needing a fire to dry out during wet weather.

18. Users did not support additional developments or facilities within the Zone unless those facilities served to eliminate a significant hazard to users (example: bridges over dangerous stream crossings). During late summer and fall, users did not perceive any of the Wilderness Zone water crossings as hazardous.

19. Most users were aware of and said they were following recommended methods for human waste disposal.

20. All users were packing their garbage out of the backcountry.

21. Nearly all the users were hanging their food supplies at night to avoid bear depredations.

22. Most users were generally satisfied with the assistance they had received from the Park Service. Exceptions to this included:

- a. Too few information aides had first-hand experience with the areas for which they were writing permits.
- b. Some users found they could not depend upon all the information they received, especially concerning the

rigorous traveling conditions they would be encountering  
in the Wilderness Zone.

23. Nearly all users (16 out of 17 parties) had or attempted  
to obtain a backcountry camping permit for the Wilderness Zone.

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APPENDIX A  
Map of Study Area

# WATERTON - GLACIER

## LEGEND

- Ranger Stations
- Backcountry Campground
- Major Visitor Information Center
- Trails
- Road
- Fire Lookout

ALL DISTANCES IN KILOMETERS



## Wilderness Camping Zone

An experimental camping zone is now established in the Nyack and Coal Creek drainages. Hikers will be permitted to camp where they choose under the following guidelines:

- No wood fires!
- Camp out of sight of the trail
- Camp at least 100 feet from streams and lakes.
- Camp at least 1/2 mile away from a patrol cabin.
- Camp out of sight of any other party.
- Camp away from meadows.
- Dispose of human waste away from water sources.
- Pack out all other waste.

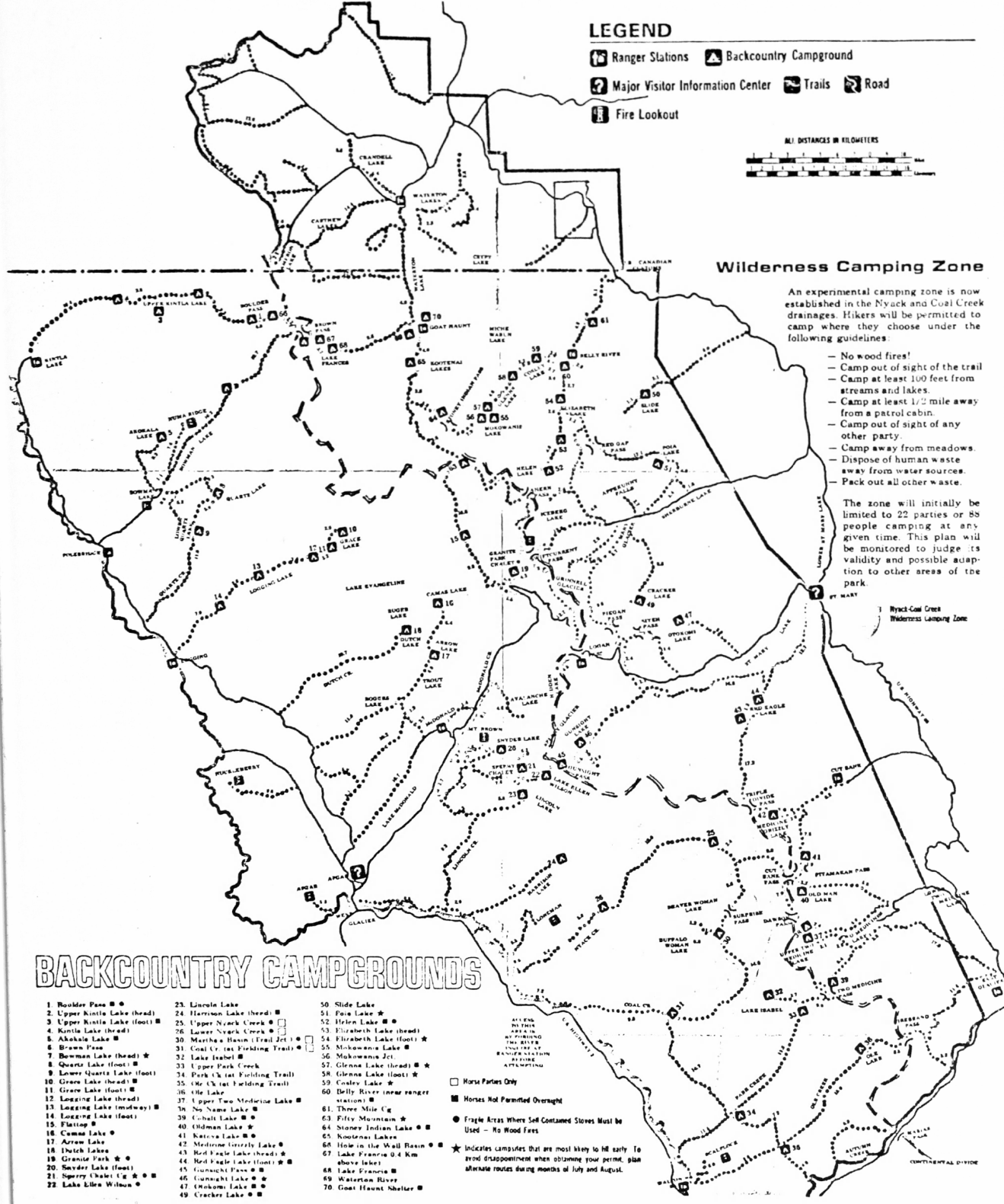
The zone will initially be limited to 22 parties or 88 people camping at any given time. This plan will be monitored to judge its validity and possible adaptation to other areas of the park.

Nyack-Cool Creek  
Wilderness Camping Zone

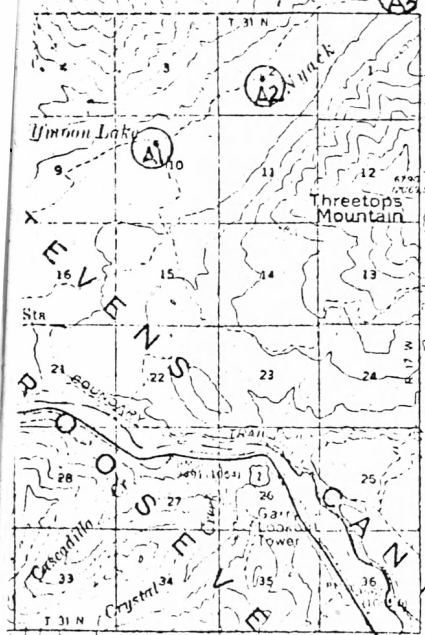
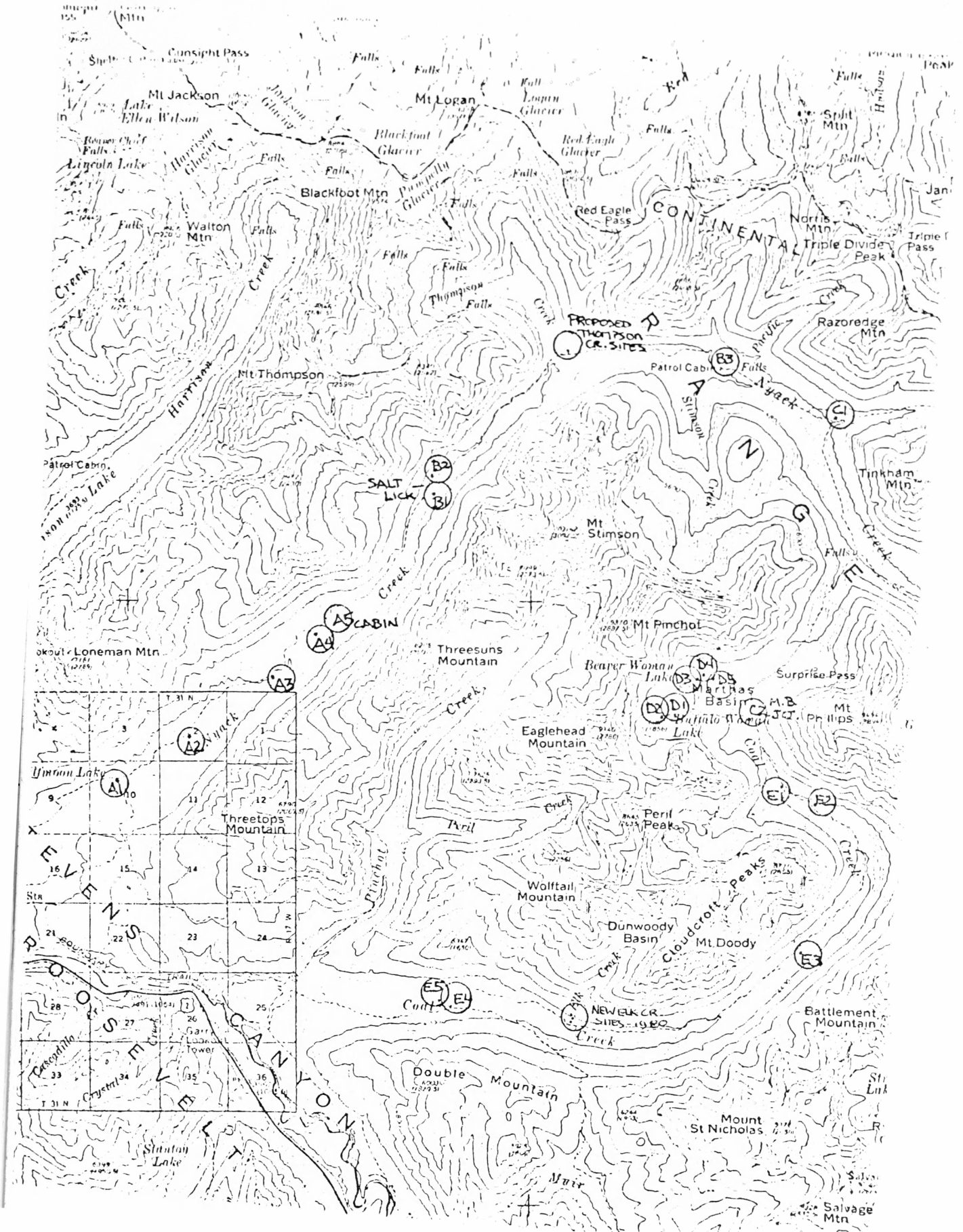
## BACKCOUNTRY CAMPGROUNDS

- |                             |                                  |                                       |
|-----------------------------|----------------------------------|---------------------------------------|
| 1. Boulder Pass             | 23. Lincoln Lake                 | 50. Slide Lake                        |
| 2. Upper Kintle Lake (head) | 24. Harrison Lake (head)         | 51. Pine Lake                         |
| 3. Upper Kintle Lake (foot) | 25. Upper Nyack Creek            | 52. Helen Lake                        |
| 4. Kintle Lake (head)       | 26. Lower Nyack Creek            | 53. Elizabeth Lake (head)             |
| 5. Akakale Lake             | 30. Martha Basin (Trail Jet)     | 54. Elizabeth Lake (foot)             |
| 6. Brown Pass               | 31. Coal Cr. (at Fishing Trail)  | 55. Mokuwani Lake                     |
| 7. Bowman Lake (head)       | 32. Lake Isabel                  | 56. Mokuwani Jet                      |
| 8. Quartz Lake (foot)       | 33. Upper Park Creek             | 57. Glenn Lake (head)                 |
| 9. Lower Quartz Lake (foot) | 34. Park Cr. (at Fishing Trail)  | 58. Glenn Lake (foot)                 |
| 10. Grass Lake (head)       | 35. Mt. Clark (at Fishing Trail) | 59. Cedar Lake                        |
| 11. Grass Lake (foot)       | 36. Old Lake                     | 60. Belly River (near ranger station) |
| 12. Logging Lake (head)     | 37. Upper Two Medicine Lake      | 61. Three Mile Cr.                    |
| 13. Logging Lake (foot)     | 38. No Name Lake                 | 62. Fifty Mountain                    |
| 14. Logging Lake (foot)     | 39. Cobalt Lake                  | 63. Stoney Indian Lake                |
| 15. Flattop                 | 40. Oldman Lake                  | 64. Stoney Indian Lake                |
| 16. Cuman Lake              | 41. Katoxa Lake                  | 65. Rostenau Lakes                    |
| 17. Arrow Lake              | 42. Medicine (river) Lake        | 66. Hole in the Wall Room             |
| 18. Dutch Lakes             | 43. Red Eagle Lake (head)        | 67. Lake Francis 0.4 km above lake    |
| 19. Granite Park            | 44. Red Eagle Lake (foot)        | 68. Lake Francis                      |
| 20. Sevier Lake (foot)      | 45. Grouse Pt. Pass              | 69. Waterton River                    |
| 21. Spryry (Lake Cr.)       | 46. Grouse Pt. Lake              | 70. Goat Mount Shelter                |
| 22. Lake Ellen Wilson       | 47. Mokuwani Lake                |                                       |
|                             | 49. Cracker Lake                 |                                       |

- Horse Parties Only
- Horses Not Permitted Overnight
- Fragile Areas Where Soil Contained Stoves Must be Used - No Wood Fires
- ★ Indicates Campsites that are most likely to fill early. To avoid disappointment when obtaining your permit, plan alternate routes during months of July and August.



APPENDIX B  
Map of Campsite Locations



APPENDIX C

Backcountry Regulations for Glacier National Park





UNITED STATES  
 DEPARTMENT OF THE INTERIOR  
 NATIONAL PARK SERVICE  
 Glacier National Park  
 West Glacier, Montana 59936



BACKCOUNTRY CAMPING REGULATIONS

All backcountry travelers who intend to build a fire or to camp overnight must obtain a Backcountry Use Permit. These permits are available at Ranger Stations and Visitor Centers. Campgrounds and trails are subject to closure at any time because of fires, bears, weather, and other factors. For these reasons, reservations for campground use are not made previous to the day before departure time. Maximum 6 days per trip.

Visitors using riding and pack stock must camp in designated sites only and must carry feed for their stock. Use hitchrails where available, where not, tether stock away from the camping area. Pets, including pack dogs, are not permitted in the backcountry.

BACKCOUNTRY MANNERS

1. Do not bathe or wash dishes or clothing in lakes or streams. Carry wash water to campsites for these jobs. Use biodegradable soap when possible.
2. At sites where wood fires are permitted, gather only dead and downed wood.
3. Burn combustible trash and pack out non-burnable trash.
4. Where toilets are not provided, use this method of human waste disposal.
  - a. Select a spot at least 30 meters (100 feet) from water and trail.
  - b. Dig a hole 15 centimeters (6 inches) deep, use a dead branch, or kick with your heel.
  - c. Cover your waste with the soil previously removed.
  - d. Nature's decomposing organisms will finish the job.

DESIGNATED CAMPGROUNDS

(Limitation - 3 nights only per campground)

Where 0 is shown for stock limitation, up to 5 head may be taken into the area, but they must not be kept there overnight.

\*Fragile areas with scenic trees, or where available fuel is exhausted. Wood fires are not permitted. Use only self-contained stoves.

\*\* For planning camping space, a party should be considered four persons or less per site.

<u>North Fork Area</u>	<u>Limitation</u>		<u>McDonald Area</u>	<u>Limitation</u>	
	<u>**Parties</u>	<u>/Stock</u>		<u>**Parties</u>	<u>/Stock</u>
* Boulder Pass, west side	3	0	* Camas Lake	2	5
Upper Kintla Lake, head	5	10	* Granite Park	4	0
Kintla Lake, head	5	10	Snyder Lake	<del>2</del>	5
* Akokala Lake	3	0	* Sperry Chalet Campground	4	0
* Brown Pass	3	5	* Lake Ellen Wilson	4	5
Bowman Lake, head	6	10	Lincoln Lake, foot	3	5
Quartz Lake, foot	3	0	Flattop	3	5
Lower Quartz Lake, foot	4	5			
Grace Lake	2	0			
Logging Lake, head	2	5			
Adair	2	0			
Logging Lake, foot	2	5			

<u>St. Mary Area</u>	<u>** Parties/Stock</u>		<u>Walton Area</u>	<u>**Parties/Stock</u>	
Red Eagle Lake, head	6	10	Harrison Lake	2	6
Red Eagle Lake, foot	4	0	Lake Isabel	2	0
* Otokomi Lake	3	0	Park Creek at Fielding/ Coal Creek Junction	3	5
* Gunsight Lake, foot	8	10	Park Creek, Upper cabin area	4	5
			Ole Creek at Fielding Trail	5	10
			Ole Lake	3	5
<u>Belly River Area</u>			<u>Two Medicine Area</u>		
* Helen Lake, foot	3	0	* Upper Two Medicine Lake	4	0
Elizabeth Lake, head	3	5	* No Name Lake	3	0
* Elizabeth Lake, foot	7	8	* Cobalt Lake, outlet	2	0
* Mokowanis Lake	2	0	* Oldman Lake	4	5
Mokowanis Junction	5	8	* Morning Star Lake	3	0
Glenn's Lake, head	3	0	* Medicine Grizzly Lake	3	6
Glenn's Lake, foot	4	8			
* Cosley Lake, north shore	4	6	<u>Many Glacier Area</u>		
Belly River (near Rgr. Sta.	3	0	* Cracker Lake (southeast slope near mine)	2	0
Three Mile (between Chief Mtn. Customs and Belly River Ranger Station)	4	5	Slide Lake	2	5
			Poia Lake, 1/4 mile above Lake	4	10
			<u>Waterton Area</u>		
* Fifty Mountain	5	5	* Hawksbill	2	5
* Stoney Indian Lake	2	0	Waterton River (across from Goat Haunt Ranger Station)	5	5
* Kootenai Lakes	4	5	* Lake Janet	3	0
* Hole in the Wall	5	0			

NYACK/COAL CREEK WILDERNESS CAMPING ZONE  
(Total Capacity 22 parties)

HIKERS: May camp anywhere in the zone as long as they:

1. Use only a self-contained, pressurized stove. No wood fires!
2. Camp: Out of sight of the trail.  
At least 10 meters (35 feet) from streams or lakes.  
At least 1 kilometer from a patrol cabin.  
Out of sight of any other party.  
Away from meadows.  
Maximum of three nights at any one site; a total of 6 nights in the zone.
3. Practice the wilderness ethic in disposing of human waste away from water sources.
4. Practice pack-in, pack-out policy to remove all other waste from the backcountry.
5. Maximum group size is 12 members. Larger groups are required to divide into smaller units.

HORSEMEN: May camp at any of the following, designated sites with a maximum of 10 head of stock. (Limitation of 3 nights per site; a total of 6 nights in the zone).

HIKERS: Who wish to use an open fire may also use these sites as fires are permitted:

Thompson Creek	1 party/10 stock
Martha's Basin, Coal Creek Trail Jct.	1 party/10 stock
Coal Creek at Fielding Trail(Elk Creek)	1 party/10 stock

TRAIL SHELTER - (Limitation - one night use only)

Goat Haunt Trail Shelter (7 units)	1 party/no stock, not to exceed 4 people in each unit
------------------------------------	---

ANY EXCEPTIONS TO THESE CONDITIONS MUST BE NEGOTIATED WITH A PARK RANGER

APPENDIX D  
Verbal Questionnaire

## APPENDIX D

Verbal Questionnaire

1. What do you think of the Wilderness Zone concept?
2. Why did you choose the Nyack/Coal Creek trip?
  - a.  Greater freedom of the zone reservation system.
  - b.  No room in other areas of the Park.
  - c.  To avoid more populated areas.
  - d.  To avoid the hassles of planning an itinerary trip.
  - e.  Other \_\_\_\_\_
3. Have you been able to locate nondesignated campsites which:
  - a. Conformed to your camping permit requirements?  YES  NO  
 Explain \_\_\_\_\_
  - b. Fulfilled your personal expectations as a "good" camp?  
 YES  NO  
 Explain \_\_\_\_\_
4. During this trip have you been able to find the degree of privacy and solitude you wanted:
  - a. While hiking on the trail?  YES  NO  
 If No, why? \_\_\_\_\_
  - b. When camped at night?  YES  NO  
 If No, why? \_\_\_\_\_

## 4. (continued)

c. Was another party's camp ever visible from yours?

YES  NO

Explain \_\_\_\_\_

d. Was another party's camp ever audible from yours?

YES  NO

Explain \_\_\_\_\_

e. How long have you been out? \_\_\_\_\_

f. How many people have you seen during this trip? \_\_\_\_\_

5. How do you feel about giving up the opportunity to build a fire for the opportunity to select your own campsite?

highly favorable,  favorable,  neutral,  against,  
 highly against

6. In wilderness or natural areas, how do you feel about bridges over:

a. creeks where hikers would otherwise get their feet wet?

highly favorable,  favorable,  neutral,  against,  
 highly against

b. rivers that might be dangerous or at least challenging to wade?

highly favorable,  favorable,  neutral,  against,  
 highly against

7. Have you encountered any locations during this trip where you feel a bridge is needed? \_\_\_\_\_

8. How are you handling your:

a. garbage? \_\_\_\_\_

b. food at night? \_\_\_\_\_

c. human wastes? \_\_\_\_\_

9. Have you had any bear encounters or sightings?

\_\_\_\_\_

\_\_\_\_\_

10. Have you been satisfied with the assistance and information you have received from Park personnel during the planning or implementation of your trip?    \_\_\_YES    \_\_\_NO

Explain \_\_\_\_\_

\_\_\_\_\_

APPENDIX E

Visitor Use Trends 1976-1980

**Example Campsite Documentation**



DATE: 9/76

DRAINAGE: NYA-1

CAMPSITE NUMBER: A2

U.T.M. COORDINATES: 980 722

ELEVATION: 3400

SLOPE: LEVEL

HABITAT TYPE: SUBALPINE FIR

SERIES:  $\blacktriangleleft$

TYPE: CLUM

PHASE: CLUM

STAND DESCRIPTION: SPRUCE & FIR

NOTE: WATER SUPPLY IS A SMALL TRIBUTARY OF NYACK CREEK WHICH USUALLY DRIES UP BY MID AUGUST

CAMPSITE CONDITION: TRADITIONAL CAMPSITE

1976- 5% VEGETATIVE GROUND COVER IN TENT PAD AREA, OLD FIRE PIT RESTORED

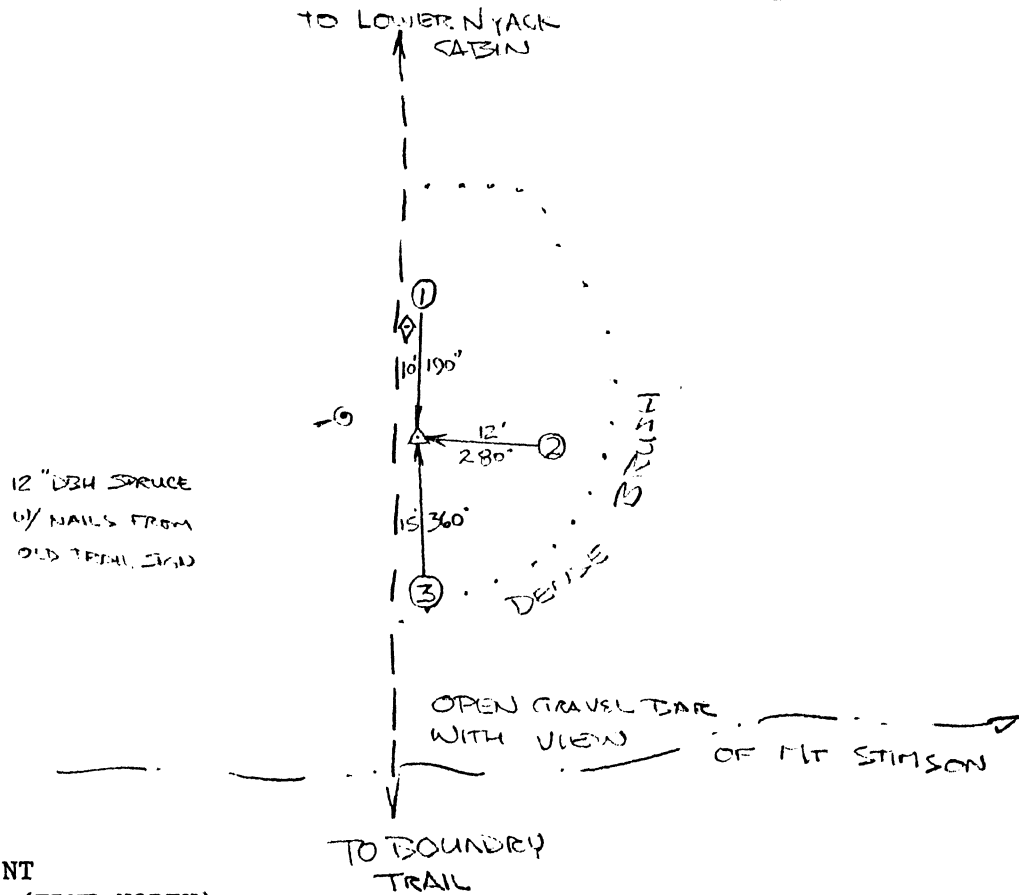
1980- 5% VEGETATIVE GROUND COVER NO EVIDENCE OF RECENT CAMPFIRES, NO OBVIOUS CHANGES SINCE 1976 EXCEPT POSSIBLE IMPROVEMENT AT SOUTH END OF SITE

SITE CONDITION CLASSIFICATION: 1976- III

1980- III

CAMPSITE LOCATION: APPROX. 4 MILES BEYOND THE OLD NYACK RANGER STATION UP NYACK CREEK. CAMPSITE IS LOCATED IMMEDIATELY BEYOND A NATURAL GRAVEL BAR FORMED BY A TRIBUTARY OF NYACK CREEK. CAMPSITE LIES IMMEDIATELY SOUTHEAST OF THE TRAIL AND IS OBVIOUS.

CAMPSITE MAP:



$\triangle$  CAMERA POINT

$\diamond$  PHOTO CARD (TRUE NORTH)

REFERENCE POINTS: (MAGNETIC AZIMUTHS)

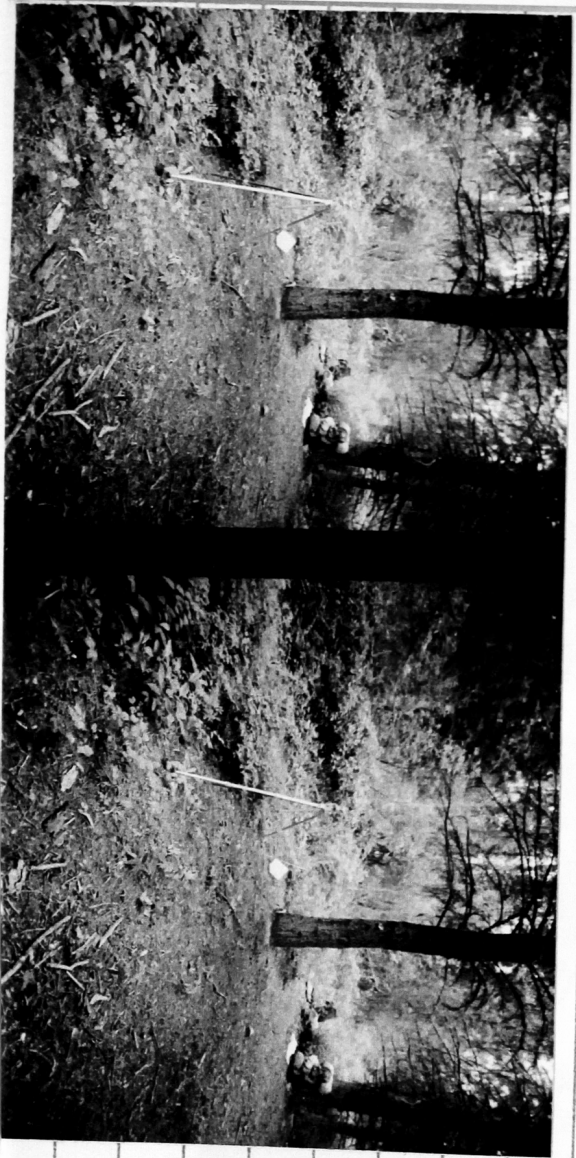
- 1) 15" DBH SPRUCE w/ TRAIL MARKER
- 2) 19" DBH " "
- 3) 18" " " "



A2 1980

A2 - 1976

PHOTOPOINT AND GENERAL SITE DETAIL



A2 1980

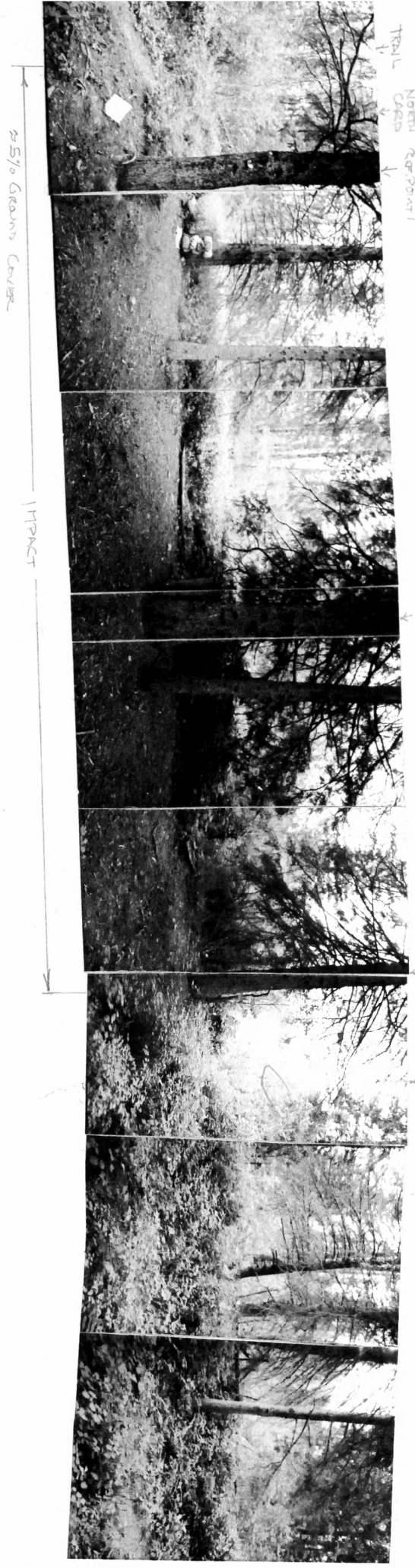


Grounds cover still ~ 5%

IMPACT

RECOVERED 1980

A2 1976



~ 5% Grounds Cover

IMPACT