USDA Forest Service General Technical Report PNW-75
1978

PUBLIC PARTICIPATION IN WILDERNESS AND BACKCOUNTRY LITTER CONTROL:

A Review of Research and Management Experience

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Contents

Abstract

This paper describes the application of the Incentive System for Litter Control to wilderness and backcountry environments. Based on research, observation, and management experience, a set of procedures was developed and is presented here. Additional management considerations are discussed.

Keywords: Litter (refuse), wilderness management, recreation use (-forest damage, public involvement.

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Introduction

This paper is less a report of research findings than an effort to diffuse existing technology. The Incentive System for Litter Control was developed in the early 1970's by researchers at the Recreation Research Project as a litter control technique meant to supplement traditional means of litter control in public campgrounds and dispersed road recreation areas (Clark 1971; Clark, Burgess, and Hendee 1972; Clark, Hendee, and Burgess 1972). Although this system was devised for use in developed recreation areas, it also has potential for helping solve the litter problem in wilderness and backcountry environments.[1/]

The objective of the studies reported in this paper was to determine the applicability of the incentive approach to controling litter in roadless areas. Based on the results of these studies and managers' experience, a set of guidelines was developed. These guidelines and some of the insights we gained while testing them are reported in this paper.

THE INCENTIVE SYSTEM

The Incentive System for Litter Control is an approach that has proven effective in controlling litter in developed and dispersed-road recreation areas. Under the incentive approach, families and children are contacted by Rangers and asked to help pick up litter (Clark 1976). They receive educational rewards in return for their participation. The incentive approach was developed through an extensive program of research by the Recreation Research Project of the Pacific Northwest Forest and Range Experiment Station and is now being used on a variety of National Forests and by other public agencies in the United States and other countries. Subsequent research provided additional evidence that incentives are an effective tool for litter control in several kinds of locations (Kohlenberg and Phillips 1973; Powers, Osborne, and Anderson 1973).

The three primary objectives of the incentive system are: (1) to achieve more effective litter control than that accomplished by traditional methods; (2) to give the public a sense or participation and responsibility by involving them in litter pick up; and (3) to educate children and adults in anti-litter behavior which may be generalized to other recreational as well as non-recreational environments.

Application of the incentive system consists of six steps.[2/]

1. Campground Rangers (or Rangers on patrol in dispersed-roaded areas) first assess the litter problem. The Ranger may decide that the litter problem is so slight that it does not warrant treatment; the key is to use the program only when and where it is needed.

2. If there is a need to use the system, the Ranger then locates families who are camped in the area with children that might wish to be involved in the program.

3. The program is explained to the parents and children, and the Ranger requests the children's involvement. Usually children are eager to participate in helping the Ranger pick up litter. In return for

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[1/] For simplicity, we have used the word "wilderness" with a lower case "w" throughout the paper as an all-encompassing term which includes specific Wilderness areas, administratively designated backcountry areas, and other unroaded forest environments in which recreation use occurs.

[2/] A programmed slide-tape is available with further details on using the incentive system. It can be obtained by writing to Forestry Instructional Services, c/o Forestry Business Office, School of Forestry, Oregon State University, Corvallis, Oregon, 97331.

their help, he offers them a choice of incentives (from a variety of Forest Service Visitor Information Service items, e.g., Smokey Bear or Woodsy Owl shoulder patches, wooden rulers, Smokey Bear or Woodsy Owl bumper stickers, bookcovers, etc.).

4. The Ranger then organizes the children and gives them litterbags. What they are to pick up (perhaps concentrating on beverage-can pull tabs or cigarette filters), and what area they are to cover is described. The Ranger emphasizes that the litterbags need *not* be full, but that the area must be clean. The Ranger should stress that the objective is to clean up the area not just fill up litterbags. Arrangements are then made to meet the children at a certain time and place. They are cautioned about potential safety hazards, (broken glass, rushing creeks, etc.) and sent on their way.

5. Next, the Ranger returns to other duties such as campground maintenance, fire patrol, visitor contact, fee collection, etc.

6. Finally, the Ranger meets the children at the prearranged time and place, collects the litterbags, and gives out the incentives. The Ranger usually takes the opportunity at this time to talk with both children and parents about other problems of which they should be aware, such as fire danger or good outdoor manners.

THE NATURE OF THE WILDERNESS LITTER PROBLEM

Litter in wilderness environments presents special management problems. The esthetic objections against litter often seem stronger in these more natural settings than in other environments even though litter usually seems to occur in smaller amounts in unroaded environments. Studies of wilderness recreationists repeatedly indicate that litter, and other human-related debris, is perceived by users to be the most annoying problem encountered during backcountry experiences (Lime 1972, Solomon and Hansen 1972, Stankey 1973).

The cost of effectively coping with litter has lent impetus to finding new methods of achieving anti-litter behavior. One U.S. Forest Service effort, designed specifically to deal with the wilderness litter problem, is the Pack-It-Out Program which encourages recreationists to pack out their unburnable refuse. The Pack-It-Out Program has resulted in numerous benefits, including increased user participation, reduced litter levels, and reduced costs. But, despite widespread us of the Pack-It-Out Program, observation indicates that the litter problem is far from solved.

For a variety of reasons, many recreationists enter wilderness areas with little exposure to the Pack-It-Out message. Many times signboards are non-existent at trailheads or they have been defaced or torn down. With a small staff to cover large areas, only a few wilderness recreationists are contacted in the field. Where permits are required, some people receive them by mail, or only one or two people actually go into the Ranger Station while a majority of the party stays outside. Consequently, many recreationists enter wilderness without exposure to the message of the Pack-It-Out Program.

To control the wilderness litter problem, managers must take into account two characteristics of the wilderness litter problem which distinguish it from litter in other environments: limited access to the area and the dispersed nature of the use.

Access

Since trails are the primary means of access to wilderness areas, the Forest Service has traditionally relied on pack stock and wilderness Rangers for removing litter from roadless areas. Many hunting parties, using large pack strings, transport a substantial amount of equipment and supplies deep into the wilderness. And, although most horse users are conscientious about burning or packing out anything left over, empty cans, bottles, and cooking grates

are typical of what often gets left behind. In addition, litter often piles up at popular shelters, lookouts and other hiking destinations used exclusively by backpackers. Great difficulty is encountered in transporting these bulky, heavy objects or large amounts of litter out of areas which are not accessible by pickup truck and dumpster; especially in certain backcountry areas where traditional use has resulted in "garbage dumps" of amazing magnitude.

Dispersion

Although certain concentrations of litter exist, much of the litter which recreationists leave behind is widely dispersed over large areas. The dispersed nature of wilderness litter makes it an expensive and time-consuming problem to control especially if it is dispersed throughout little-used areas (remote wilderness campsites, climbers' camps, mountain passes and other viewpoints, and along trails, etc.). When wilderness Rangers must spend a large portion of their time ranging over broad geographic areas to pick up litter, they have less time to spend on other important duties such as visitor contact and education, maintenance of trails and facilities, and enforcing rules and regulations.

Applying the Incentive System in Wilderness and Backcountry

1. *First Year--1972--The Material Incentive Experiment.*

The U.S. Forest Service Recreation Research Project in Seattle, in cooperation with the Pacific Northwest Region of the Forest Service, began investigating the applicability of the incentive approach to litter control in wilderness environments in the summer of 1972.

A modified incentive system was employed in the Glacier Peak Wilderness Area of the Mt. Baker National Forest. As originally conceived, the incentive system used in the wilderness was little different than the developed-campground phase of the system. Wilderness Rangers passed out coupons to selected recreationists which they could later redeem at local sporting goods stores for a variety of items including posters, strawflower seeds, safety whistles, permanent matches, and stuff sacks, as well as a chance to win a backpack. All of these incentives were provided by a local outdoor equipment manufacturing company. In return for a coupon, the recreationist agreed to pick up and/or pack out specified amounts of litter from the area.

Upon identifying a litter problem during this study, the wilderness Ranger would adopt one of two approaches.

a. If the litter was concentrated around popular, heavily used areas (often day-hike destination areas), the Ranger would contact nearby recreationists, explain the nature of the litter problem, and request their participation in picking up litter and packing it out of the area in exchange for the coupons. Participating recreationists could then take the coupon to one of the cooperating merchants and pick out the incentive of their choice. They were told that by turning in their coupons, they were automatically in the running for the backpack that would be given away in a drawing at the end of the summer. If the recreationist chose to participate, he was given a litterbag with a coupon stapled to it and verbal instructions concerning where and what to pick up. The Ranger would then move on to other duties, (enforcing fire restrictions, trail maintenance, backcountry use education, etc.), or other areas, leaving the recreationist to pick up the area and carry the litter out with him.

b. If, on the other hand, the litter was in a remote area, or dispersed around a little-used area, the wilderness Ranger picked the litter up himself and then asked recreationists to carry it out with them in exchange for a coupon. Participants were asked to deposit the litterbags in the garbage cans at the trailheads.

The data we collected indicate that forty seven 5-gallon bags (235 total gallons) were carried out of the wilderness by recreationists over distances ranging from 1/2 mile to 18 miles. We recorded only two instances where backpackers failed to carry out the bags of litter after they promised to do so. Before-and-after counts of specific areas to determine the effectiveness of the pick-up and pack-out phase of the program indicated that reduction of litter on the ground ranged from 4 to 89 percent. Litter was reduced by an average of 40 percent over the 15 situations that were monitored. In addition to the amount of litter which we know was removed from the wilderness in exchange for the coupons, we handed out coupons in many other situations where it was impossible to monitor the actual amount of litter reduction and removal. In all, a total of 524 coupons were given out during this study.

Evaluation of the results indicated that further modification of the incentive procedure was necessary. Although recreationists were extremely cooperative, many reacted negatively to the nature of the incentives. Although the research staff has yet to hear a complaint from recreationists concerning Smokey Bear or Woodsy Owl items as incentives with children, many adult recreationists dislike the commercial aspects of the coupons provided by the outdoor recreation equipment company, which ostensibly "gave away" posters, safety whistles, and a "free" chance on a backpack in return for litter pick up. Some recreationists felt that the coupons were merely a public relations ploy, with the underlying motive of luring customers into stores where the company's equipment was for sale. In addition, a small percentage of backpackers objected to the use of *any* incentive to achieve anti-litter behavior. They felt that people should not be given rewards for behavior in which they should engage anyway.

As indicated above, backpackers' objections to redeemable coupons from a private company did not seem to stop them from participating in the program by picking up and packing out litter. However, only 55 of the coupons were redeemed. The low coupon redemption rate--10.5 percent--coupled with the high number of recreationists who participated in the program, indicated that perhaps tangible incentives were not needed in a wilderness litter program involving adults. It appeared that a request for aid from the Ranger, combined with the common desire of recreationists to keep the wilderness clean, sufficiently motivated involvement in the program for most users who were contacted.

2. *Second Year--1973--Verbal Appeals as an Incentive*

As a result of the 1st year's study, the approach used the following year was modified to exclude tangible incentives for adults. Since rewards such as Smokey Bear shoulder patches have proven extremely effective in motivating children to participate in anti-litter activities, whether in developed areas or wilderness, their use with children was continued. To involve adults, Forest Service wilderness Rangers relied on their altruistic motivation which was so evident during the previous year. Litterbags were again provided by wilderness Rangers who contacted recreationists. Data were collected in a variety of popular areas frequented by day hikers and backpackers by two wilderness Rangers each on the Darrington and Monte Cristo Ranger Districts of the Mt. Baker National Forest, and two research assistants from the Recreation Research Project.

During this year, fifty one 5-gallon bags (255 total gallons) were packed out of the wilderness. The actual amount may have been double that since the wilderness Ranger who contacted the most people (45 parties) did not keep a record of the amount of litter that was carried out. Verbal appeals and instructions from wilderness Rangers were used exclusively when soliciting assistance from recreationists in packing out litter, except that Smokey patches were used with five parties which included children.

This study demonstrated that verbal appeals, litterbags, and accompanying

instructions by wilderness Rangers serve as sufficient motivation to elicit anti-litter behavior, and that tangible incentives continued to be highly effective in developing anti-litter behavior in children.

3. *Third Year--1974--Testing Guidelines for Verbal Appeals*

Wilderness Rangers and members of the research staff tested different approaches under a variety of conditions during 1972 and 1973 in order to determine the best circumstances and procedures for involving the public in litter control. Based on this experience, guidelines were developed for litter control in wilderness environments using verbal appeals as the incentive. The objective of the 1974 study was to test the effectiveness of these guidelines as a tool for managing the wilderness litter problem.

The overriding lesson learned from the previous studies is that the effectiveness of a wilderness litter control program is highly dependent on a variety of situational variables. These variables can be constraining factors in terms of where and how a litter control program will be successfully implemented. Factors which significantly affect the successful implementation of the program include: (a) characteristic use of the area (e.g., day use, weekend use, of a more extended duration), (b) the nature of the job to be accomplished (e.g., picking litter up and packing it out, packing it out only, etc.). (c) characteristics of the recreationists or the recreation experience (e.g., age, available time, activities they are engaged in, etc.), (d) the nature of the incentive (e.g., an altruistic appeal vs. a tangible incentive, the type of tangible incentive, etc.).

The effects and influences of these and other variables must be incorporated into any litter program intended for use in a wilderness environment. In designing the following guidelines, we have attempted to consider the variables which we have identified as important.

For wilderness Rangers to successfully utilize the guidelines explained below, it is necessary for them to carry a sufficient quantity of litterbags and Smokey Bear and Woodsy Owl incentives to undertake a treatment when the situation warrants it. This requires planning to identify litter problems and user densities. With a little forethought, it should be fairly simple to schedule these activities into the Ranger's normal routine. The guidelines tested during this study involve the same concepts as those developed for use in roaded recreation areas, but they have been modified to account for problems which are specific to roadless areas.

4. *Guidelines.* The guidelines developed and tested during this summer consisted of four distinct steps.

Step 1. *Identify the Litter Problem.* The wilderness Ranger must first size up the nature of the problem: is the litter dispersed or concentrated, does it consist mostly of smaller items that can easily be picked up and packed out, is the area dirty enough to warrant treatment? The nature of the litter problem determines the next step in the procedure.

Step 2. *Contact users in the area, choose which collection method is appropriate to the situation, and explain the program.*

(a) *Pick up and pack out*--this approach is best utilized at a day-use area or a very popular backcountry destination. If the litter is fairly concentrated and can be easily picked up, the Ranger should contact parties in the area that have children or young adults with them (we have found that children in the 7-12 age group respond most enthusiastically). The Ranger should then approach the recreationists; and after a few pleasantries (e.g., are you enjoying your trip?), he should explain that the Forest Service, as part of its Pack-Out-Program, would like their help picking up and packing litter out of the area. The Ranger should show the incentives (Smokey Bear

or Woodsy Owl shoulder patches, etc.) to the children and tell them they can choose one if they help. Usually they will respond positively, and the parents will generally give permission for their children's participation.

(b) *Pack out only*--If the Ranger determines that the situation is inappropriate for involving recreationists in litter *pick up* (because of a lack of people, the dispersed nature of the litter, type of litter, or because backpackers are passing through the area carrying heavy packs, etc.), he should pick up the area himself. This usually occurs at remote backcountry sites, along trails, and near little-used lakeshores or hunter's camps. After the litter is bagged up and transported to a location where backpackers or day hikers are likely to visit or pass by, the users are contacted and their help in packing out litter is solicited.

Often it is awkward to stop people carrying heavy packs or who have their hiking momentum going, so the ranger must be sensitive when approaching backpackers who are traveling. After the contact is made and it becomes apparent they don't mind stopping, the Ranger should explain the program (as in the pick-up and pack-out phase) and ask if they would mind packing a bag or two of litter out of the area to dispose of it at home or in a convenient litter barrel along the way. It is extremely important at this point to determine whether the party is near the end of its trip. It is unreasonable to request people just beginning an extended hiking trip to carry bags of litter with them. It is appropriate to use tangible incentives for soliciting the help of any children with the groups.

Step 3. *Organize the Pick Up/ Pack Out Effort.*

(a) *Pick up and pack out*--After recreationists have indicated a willingness to help, the Ranger must explain to the parents and children specifically what needs to be done. He should request *specific tasks* rather than general help in litter control. He must explain to the children what areas need picking up, perhaps emphasizing that a special effort is needed with cigarette filters or other persistent litter. The Ranger can give the incentives either to the children in return for their assurances that they will clean the area, or he can give the incentives to the parents for distribution when the job is completed. At this point, the Ranger should give each participant a litterbag and emphasize that the job is not complete until the litter has been picked up *and* packed out of the area.

(b) *Pack out only*--After contacting backpackers and hikers who have expressed interest in helping pack litter out of the wilderness, it is important to allow the recreationist to decide how much he wants to carry (which generally depends on his load and distance to travel). One backpacker packed out four full bags of litter during the 1972 study (on a level, 1-mile hike with light backpack); but a heavily loaded backpacker might indicate that one bag or less is enough. The Ranger should keep in mind that one objective of the program is to eliminate special trips by Forest Service personnel and pack stock. He should strive to meet his objective by encouraging hikers and backpackers to transport as much out of the wilderness as is comfortable. But the recreationist is the final decisionmaker.

Step 4. *Return to Other Duties.* After the participants are organized, the Ranger can then return to other duties such as public contact, trail maintenance, or site rehabilitation. An advantage of the system is that once the litter problem has been alleviated with the help of cooperating users, the Ranger is free to return to or take up other pressing management duties that require special skill or knowledge.

To ensure variablity during the test of these guidelines (i.e., variability of geographic area, user groups, and wilderness Rangers), five wilderness

Rangers from several National Forests were involved during the 1974 field test. They were all instructed in the use of the system by Recreation Research Project personnel. The Ranger utilized a different approach depending on the specific situation encountered, i.e., (1) short trips involving day hikers, (2) extended trips involving backpackers, and (3) extended trips involving horse users. Table 1 summarizes the results of the data collected by the five Rangers during the 1974 field season.

Litter Control by Backpackers

Previous experience in 1972-73 indicated that the emphasis in wilderness litter control involving backpackers should be on packing out litter that had already been collected and bagged up by the rangers, although users may be involved in picking up litter in certain locations. A major problem in wilderness is the way litter is dispersed--it often occurs in widely scattered, lightly used campsites (such as infrequently used hunter or fishermen's camps). This litter usually is most easily collected by the Forest and pack it out with them. They were also asked to pick up along trails. The participation of children, in exchange for shoulder patches, was used most often in a day-hike environment. Rangers made contacts with hikers during routing patrol trips to these areas.

Table 1--User contact and participation by user type--summer 1974

Contacts	Back-packers	Day hikers	Horse users	Total
Number of parties contacted	9	22	6	37
Number of people in the parties contacted	33	125	21	179
Amount of litter packed out (by 5-gallon bags)	13	52	18	1/ 83
Number of people who refused to participate 2/	3/ 2	4/ 13	4/ 3	18
Number of times Smokey Bear patch was employed	8	5	--	13
Number of times that verbal appeal and instructions were employed	8	17	5	27

1/ Total of 415 gallons of litter packed out.

2/ *Day hikers*--Two people in the party "didn't want anything to spoil their day." Other two members of the party packed out one bag each.
Backpackers--At the time of contact, the party had 8 miles to go in 2 days. They felt that they could not sustain the extra weight and bulk for that length of time.
Horse users--The party expressed the feeling that saddle stock cannot be used for both riding and pack work. Since they only had saddle horses, they felt it would be inappropriate to pack litter out on them.

3/ One party--two people in the party refused to participate but the other two people in the party agreed to carry out one bag of litter each.

4/ One party.

Litter Control

Involving Day Hikers

Day-hike areas often have litter concentrated in intensive-use areas such as lake shores, trails, and around popular fishing, sight-seeing, and camping spots. Hikers were contacted and asked to pick up litter in these areas of high concentration

Service Ranger in routine visits to these areas. This "bagged" litter was then assembled at a central location on a main trail, at a shelter, or in a wilderness campground. At that point, the Ranger contacted backpackers to request their participation in carrying the litterbags out of the wilderness.

Litter Control by Wilderness Horse Users

A major problem in roadless recreation areas is that large items brought in by pack horse are often too heavy or bulky for Rangers or backpackers to carry out. These include items such as refrigerator racks, large cans, big plastic jugs, and abandoned cast-iron stoves. Horse users were utilized to help transport these items and large caches of litter out of the wilderness.

Involving wilderness horse users in a litter control program may present special problems. One unforeseen benefit of the Incentive System, however, which was discovered during its application in developed campgrounds and dispersed car camping areas is that the program provides the opportunity for positive public contact with members of specific user groups (Clark, Burgess, and Hendee 1972).

For example, in 1970 in the Taneum Creek area in the Wenatchee National Forest, Recreation Research personnel initially encountered indifferent or antagonistic receptions as they contacted users (who happened to be motorcyclists) at their campsite. This user group was used to being contacted or reprimanded about their rule-violating behavior (lack of spark arresters, noise and dust-related problems, using ORV's in prohibited areas, etc.) and, as a consequence, many saw contact with Forest Service patrolmen (as well as personnel from other agencies) as a negative experience.

The unfriendly, cold attitudes of ORV users in the Taneum area changed, however, when they perceived that Forest Service patrolmen were approaching them for another purpose. After the researchers explained the program, they resumed their usual duties, promising to return later to hand out incentives and collect full litterbags. On their return trips, they were given friendly receptions. Recreationists who had witnessed the enthusiastic participation of their children in a meaningful program were pleased with their new role of "cooperators."

There may be similarities between motorcycle users in dispersed camping areas and some horse users in wilderness environments, including the feeling that Forest Service regulatory enforcement is restricting their freedom. It is necessary that the Ranger who contacts the horse user with the intention of involving him in the litter control program do so sensitively. Forest Service personnel who have used the incentive system with off-road vehicle users have noted, however, that it can be the basis for a very positive public contact with this group, and if used correctly, the same result can be achieved with horse users.

To involve horsemen in the program, the Ranger should first collect the litter into manageable units. That is, he should carefully bag up the losse litter; using discarded plastic rain flys or canvas tarps to envelope cans, wire, broken glass, and other material which could gouge or poke a horse; bundle and tie old tin roofing material into compact sizes; squash 5-gallon cans; etc.; and do whatever else he feels is necessary to facilitate transportation of the litter by saddle or pack stock.

Once the litter has been "packaged", the Ranger should approach horse users in camp or on their way out of the wilderness, explaining that the Forest Serice has a major wilderness litter problem, and request the horse users' help in packing the litter out of the area. Many times the opportunity for more than a passing hello is nonexistent and the Ranger should not force the issue. Unless stopping the riders as part of checking for wilderness permits, it may be necessary to play a more passive role unless the packer

or rider indicates that he wants to stop and chat. Another opportune time to talk to horse users is when stopped to water their stock.

After the horse user indicates willingness to participate in the program, the wilderness Ranger should do all he can to assist the user in attaching the full litterbags to the packframe or saddlebags. Some users simply hold the litterbags by the drawstrings or loop them around the saddle horn and carry them out. Most horse users simply pack them right into the saddlebags or onto the packframe.

It is of the utmost importance, whether contacting the horse user or assisting him strap the litterbags to the packframe, to remember that many horses are skittish and do not respond favorably to strangers. Also, many horsemen are wary about strangers handling their stock. It is best, therefore, that the wilderness Ranger take his cues from the horseman regarding his behavior around the horses (in terms of stopping the group to chat, length of time spent talking to the riders, amount of help in strapping litterbags onto the saddlebags, etc.). If the litter to be packed out is noisy, sharp, heavy, etc., the user should be appraised of its condition and invited to inspect it or repack it any way he chooses.

Probably the most important aspect of the litter control program involving wilderness recreationists is that the Ranger should strongly emphasize that by picking up and/or packing litter out of the wilderness, the participants are providing much-needed assistance. He should, without exception, remember to thank them for cooperating in controlling this problem.

The data in table 1 and our observations suggest that wilderness and backcountry recreationists are a willing resource for controlling litter. The 415 gallons of litter and trash that were packed out by nearly 200 recreationists in 1974 would in previous years have been packed out by management personnel or it would not have been packed out at all. Litter packed out of the wilderness by Rangers and pack stock represents time and money that could be better spent on more important management activities.

The data further indicate the potential for involving different user groups to help control the litter problem. Horse users, backpackers, and day hikers all expressed a willingness to help. The data also confirm that the guidelines which we have developed can be flexibly employed as a supplement within the general "Pack-It-Out" framework by a perceptive and sensitive Ranger. But most importantly, the data indicate that adult wilderness recreationists respond very positively to verbal appeals for assistance and accompanying instructions from wilderness Rangers.

Conclusions and Additional Management Considerations

Recreation Research Project personnel have been involved in research, development, and application of the Incentive System for Litter Control since 1969. During this time, we have gained certain insights into different aspects of the litter control problem as a result of observations and contacts with many users and management personnel. We would like to take this opportunity to communicate some impressions to our forest manager colleagues.

These observations should be viewed as subjective impressions gained from an intensive involvement in this area of research rather than from empirically-derived data. Nevertheless, we offer these observations in the hopes that they may be helpful in understanding the full implications of the guidelines for litter control as they apply to roadless recreation environments.

1. *Involving Special User Groups*

This report specifically addresses the problems and procedures of involving horse users, day hikers, and backpackers in a program to control wilderness litter. Thus far we have conducted no formal research geared to other roadless-area users, such as snowmobilers, motorcyclists, and cross-country skiers. We feel, however, that the logical extension of the Pack-It-Out Program to involve members of other recreation groups is not only feasible but desirable. One of the most important potential benefits of this system is that, by involving users, they may gain a sense of participation, pride, and responsibility regarding their public lands. This being so, it is important to involve a broad spectrum of recreationists so that the benefits derived by the various user groups, by the Forest Service, and by the general public will be increased. It should be relatively easy to adopt the system in such a way so as to extend coverage to these groups. There is no reason to think that members of these groups will not respond as positively to verbal appeals and Smokey Bear patches as do other recreation clientele groups.

Involving specific groups such as hunters and fishermen may, however, present special problems. The nearly unanimous consensus of the wilderness Rangers that we have worked with over the past 5 years is that hunters and, to a lesser extent, fishermen are responsible for a large proportion of the litter problem. This is not merely selective perception on the part of Rangers. A traditional attitude among some sportsmen, as exemplified by an article in *Sports Afield* (Jobson 1974), is that it is not always necessary or possible to pack out everything they pack in. Consequently, a challenge exists to develop incentives and implement guidelines for the successful involvement of hunters and fishermen in a wilderness litter control program.

2. *Contacting Backcountry Users, the Role of the Wilderness Ranger*

Throughout the research and implementation of the developed campground phase of the incentive system for litter control, members of the research staff were surprised at the reaction of many managers who expressed opposition to the incentive system. In other cases apprehension was expressed through the behavior of the Rangers or their supervisors who verbally approved of the system but refused to implement it.

We believe that much of the past resistance by Forest Service personnel to implement the system in unroaded areas is grounded in the same fears which initially created a reluctance in developed campground managers to apply the system there: namely, the unfounded perception that recreationists want a minimum of contact with Forest Service recreation managers, especially if it involves requesting assistance. The overwhelming positive public response to and acceptance of the procedures that have been developed demonstrates that these fears are seldom based on fact. Much of the day-to-day behavior of individual rangers may, however, be predicated on this particular perception.

The problem is accentuated by the fact that many of the people recruited for the wilderness Ranger position are wilderness recreationists themselves. They are aware, both through personal experience and exposure to environmental literature, that solitude is a prime value of wilderness and that there are strong social norms which minimize *interparty* contact in wilderness areas.

Our experience, however, suggests that although wilderness recreationists clearly seek to minimize contact with other parties, contact by a wilderness Ranger is not generally regarded as an intolerable social intrusion. Indeed, in many cases, recreationists actively seek out wilderness management personnel as a source of general information and expertise. Unfortunately, many wilderness Rangers have undoubtedly passed up opportunities for assistance in litter control as a result of this perception.

We do not intend to imply that there is no need for sensitivity to

the desire for solitude. Some people, especially wilderness purists, may consider such a contact as an intrusion. Contacts with anyone, including Rangers, may be undesirable in remote, off-trail zones; but there may be other areas (e.g., trunk trails, wilderness campgrounds, etc.) where the character of the users or the definition of the situation may be more amenable to contact and participation in the program without adversely impacting the wilderness experience.

Another consideration concerning the role of the wilderness Ranger is that they often perceive themselves as "garbage-collectors and fix-it persons." Wilderness management increasingly is being viewed as "people management". This is especially true of the wilderness Ranger's function. He often serves as the only link between the management agency and a special portion of its clientele. As such, it would seem desirable to spring him out of the "garbage-collecting" business and into a higher level of involvement where he is helping to manage behavior and, thus, the human impact on the wilderness resource. There are a wide range of important management activities (e.g., increased user contacts, site and resource inventories, gathering public input, disseminating management information, etc.) which a wilderness Ranger could become involved with if he were encouraged and reinforced to do so by institutional and supervisory mechanisms.

FLEXIBILITY IS THE KEY

One of the most important factors to be remembered in controlling wilderness litter is the need for flexibility. Forest Service personnel will probably always be involved somewhat with picking up and packing litter out of wilderness environments. Sometimes recreationists will not be available to participate in litter control activities. At other times people may be available but for one reason or another will choose not to be involved.

Primary objectives of litter control programs in wilderness environments, however, should be to eliminate "special effort" trips by Forest Service personnel and pack stock undertaken for the sole purpose of picking up and packing litter out of the wilderness, and to free wilderness Rangers for other important duties. An imaginative, perceptive wilderness Ranger might very well come up with modifications of these procedures which are better suited to local conditions.

For example, one wilderness Ranger involved the District trail crew in the pack-out phase of the program. Another wilderness Ranger built up rapport with one packer in her area to the extent that the packer regularly stops to ask if she has any bagged up litter to carry out to the trailhead. Another Ranger cached bagged-up litter near a popular shelter and in the course of his visitor contact duties, asked backpackers if they would mind carrying out a bag or two if they were passing that particular shelter on their way out. One District has had good results with caching bagged litter and supplying maps of these caches to a variety of organized user groups (Scouts, Outward Bound, etc.) who take some of this bagged-up litter out with them. One Ranger left bags of litter on the trail with a note attached which requested backpackers to carry it out with them. This same Ranger had successful results using lunch-sack-size cellophane bags instead of traditional 5 gallon litterbags. We are also aware of other innovative modifications. We feel that supervisors would be well-advised to encourage their personnel to experiment within the general guidelines described in this paper.

It is our belief that if the modified incentive system which we have described can be integrated into the Pack-It-Out Program, it will result in the increased effectiveness of litter control efforts in wilderness environments. In addition, by involving the public in the participatory control of the litter problem, sustained, long-term anti-litter attitudes may be fostered which will also contribute to the eventual elimination of the litter problem in unroaded recreation areas.

Acknowledgment

The authors wish to acknowledge help of many wilderness managers in development and testing of the guidelines presented in this paper. In particular, our special appreciation goes to Jim Durdan, District Ranger, Weaverville Ranger District, California Region; John Geyer, Energy Coordinator, Mt. Hood National Forest, Pacific Northwest Region, and Bernie Smith, Resource Assistant, Mt. Baker-Snoqualmie National Forest, Pacific Northwest Region.

Literature Cited

Clark, Roger N.
1971. Litter control: an experimental analysis, Ph.D. dissertation, University of Washington, Coll. For. Resour., 114 p.

Clark, Roger N.
1976. How to control litter in recreation areas: the Incentive System. USDA For. Serv., Pac. Northwest For. and Range Exp. Stn., Portland, Oreg.

Clark, Roger N., John C. Hendee, and Robert L. Burgess.
1972. The experimental control of littering. J. Environ. Educ. 4(2):1-7.

Clark, Roger N., Robert L. Burgess, and John C. Hendee.
1972. The development of anti-litter behavior in a forest campground. J. Appl. Behav. Anal. 5(1):1-5.

Jobson, John.
1974. There's a lot of trash written about garbage. Sports Afield 172(2):96-97.

Kohlenberg, Robert, and Thomas Phillips.
1973. Reinforcement and rate of litter depositing. J. Appl. Behav. Anal. 6(3):391-396.

Lime, David M.
1972. Large groups in the boundary waters canoe area--their numbers, characteristics, and impact. USDA For. Serv. Res. Note NC-142, 4 p., North Central For. and Range Exp. Stn., St. Paul, Minn.

Powers, Richard B., J. Grayson Osborne, and Emmett G. Anderson.
1973. Positive reinforcement of litter removal in the natural environment. J. Appl. Behav. Anal. 6(4):579-586.

Solomon, Michael J., and Edward A. Hansen.
1972. Canoeist suggestions for stream management in the Manistee National Forest of Michigan. USDA For. Serv. Res. Pap. NC-77, 10 p. North Central For. and Range Exp. Stn., St. Paul, Minn.

Stankey, George H.
1973. Visitor perception of wilderness recreation carrying capacity. USDA For. Serv. Res. Pap. INT-142, 61 p. Intermountain For. and Range Exp. Stn., Ogden, Utah.

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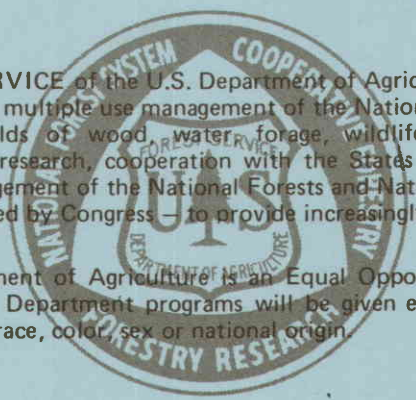

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