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# Improving Voluntary Registration Through Location and Design of Trail Registration Stations

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## RESEARCH SUMMARY

Poor registration rates at unattended trail stations have become a concern to managers who rely on such registration for information about wilderness use and users. Reliable data that accurately describe wilderness visitors and their use patterns allow managers to provide better opportunities for wilderness experiences and to better protect wilderness resources. This report describes an investigation of reasons that influence the visitor's willingness to register and whether compliance rates can be raised to useful levels.

A review of prior research showed that sign design (visibility and message), trail register maintenance, card design, and location of the trail register all influence compliance. Sign design and the location of the registration station were judged the two most important factors influencing registration. On this basis, a study of two different trail registration stations was conducted on three popular trails in the Bob Marshall Wilderness in Montana. A new sign was developed to depict both hikers and horse users registering and include a message about how the collected data were to be used. Effectiveness of this new sign was compared to the standard Forest Service sign currently used. Registration stations located at trailheads were compared with stations located 1 to 3 miles (1.6 to 4.8 km) up the trail.

Results showed location is the most important influence in improving registration rates. Moving the control sign from the trailhead up the trail almost doubled the registration rate. The experimental sign when moved up the trail raised registration from 50 percent to 69 percent. Separating the data by user type showed that visitors using horses and camping overnight responded well to the experimental sign up the trail. Registration was raised from 20 percent to 56 percent. Day hikers responded well to both the experimental and control signs up the trail (65 percent registered). Hikers who camped overnight had the highest registration of any group, with 88 percent registering in response to the experimental sign up the trail.

Selecting a good site for a registration station is a matter of judgment; however, the following criteria are universally useful: Signs should be visible for reasonable distances; the site should offer horse users a safe place to stop; the site should be placed where visitors are likely to stop for a rest, to drink, or to view some scenic attraction.

# Improving Voluntary Registration Through Location and Design of Trail Registration Stations

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## IMPORTANCE OF VISITOR REGISTRATION

Wilderness managers who understand visitors and their use patterns can provide better opportunities for wilderness experiences while protecting wilderness resources. Over the past two decades managers have relied extensively on voluntary registration to gain information about wilderness use and users. Information from registration stations can be used in workload planning and budgeting and has a variety of other uses. For example, knowledge of the user's primary method of travel is relevant to management decisions involving trail layout, design, and maintenance. The amount and distribution of use identifies trends that require increased management effort. Similarly, party size influences campsite management techniques and such knowledge may help in decisions about limits on party size. Information such as the visitor's Postal Service ZIP Code allows well-targeted informational campaigns. Because managers have needed and used information such as this, self-registration systems became a popular and inexpensive way to obtain information that would help in providing better wilderness experiences for visitors.

In the past, users have supplied the requested information at compliance rates believed to be fairly high. Early experimental studies in northwestern wildernesses examined visitor compliance with various trail register systems, and generally showed high response rates (Wenger 1964; Wenger and Gregersen 1964; James and Schreuder 1971; Lucas and Kovalicky 1981). Later studies, however, depict low and variable registration rates (Lucas 1983). For example, at seven trailheads in the Bob Marshall Wilderness, the overall compliance was 20 percent. This rate reflects low compliance by horse users, hunters, and day users and is not unique to the Bob Marshall. Because considerable variation in compliance among wildernesses exists (table 1), data from unmanned registers may be difficult to use.

When data not representative of the population of wilderness users are expanded, the resulting information is unreliable. Separate projections for each user type would improve reliability (Lime and Lorence 1974); however, very low compliance would not be useful for visitor use estimates.

Troxel (1981) suggested that voluntary registration be dropped if compliance rates could not be raised. A reliable information base is essential for good management decisions. Other methods, such as automated cameras,

Table 1.—Reported voluntary trail registration rates from 11 studies over 20 years (taken from: Lucas 1983)

| Areas   | State      | Year    | Registration rate |
|---|------------|---------|-------------------|
|   |            |         | <i>Percent</i>    |
| 1. Three Sisters Wilderness and Mountain Lakes Wilderness | Oregon     | 1961–62 | 74                |
| 2. Mission Mountains Primitive Area                       | Montana    | 1968    | 65                |
| 3. San Geronio Wilderness                                 | California | 1969    | 77                |
| 4. Rawah Wilderness                                       | Colorado   | 1970    | 89                |
| 5. Selway–Bitterroot Wilderness                           | Montana    | 1974    | 28                |
| 6. Idaho Primitive Area                                   | Idaho      | 1974    | 18                |
| 7. Sawtooth Wilderness                                    | Idaho      | 1975    | 78                |
| 8. Waterton Lakes National Park                           | Alberta    | 1976    | 78                |
| 9. Spanish Peaks Primitive Area                           | Montana    | 1977    | 50                |
| 10. McCormick Forest                                      | Michigan   | 1978–79 | 67                |
| 11. Bob Marshall Wilderness                               | Montana    | 1981    | 20                |



photoelectric traffic counters, pressure-plate counters, and observers stationed along trails, provide information about wilderness visitors. Nevertheless, trail registration stations have the potential to provide considerably more information (such as direction of travel, intended destination, length of stay, residence, number in group), operate at all times, and are less expensive to establish and service (Echelberger and others 1981). Given the costs of other methods, it is worthwhile to examine reasons for noncompliance in the voluntary registration system and determine if compliance rates could be increased to a useful level. The literature was searched to identify factors that influence visitor registration. This done, two factors of special significance (station location and sign design) were selected for experimental manipulation to determine the true influence of each and to determine if compliance could be raised to satisfactory percentages.

## FACTORS THAT INFLUENCE REGISTRATION RATES

Registration depends on the visitor's willingness to take the time and effort to fill out a questionnaire. To be successful, a message requesting the visitor to do this must be effectively communicated. The visitor must believe registering is worth the effort. Sign visibility, message, maintenance, card design, and location all influence the visitor to register.

### Sign Visibility

Historically, signs have been designed to fit the "wilderness experience," which seems to include muted colors and rustic designs. Registration stations that seem too "commercial" may offend users (Lucas and Oltman 1971); however, it is possible that the standard Forest Service sign is so unobtrusive that it fails to catch the visitor's attention. The color and the placement of the trail sign need to be such that the visitor cannot miss it (Lucas and Kovalicky 1981). The horse user must see the sign in time to make a controlled stop before reaching the registration station. A sudden stop with a pack string may be dangerous. User awareness of the sign is also dependent on an adequate sight distance along the trail, which will be discussed later.

### Sign Message

Although sign color influences visibility, the message itself is probably of greater importance. It has been found that even a lack of information influences visitors (Brown and Hunt 1969). Both horse users and hikers we talked to suggested that there is a need for registration information to be explained more fully. Leatherberry and Lime (1981), in a study in Wisconsin, found that hikers thought that the sign message should explain the need for registering. Although sign wording varied in their study, depending on whether the permits were voluntary or mandatory, the basic message was "please register." Nearly half of the Wisconsin users queried felt that compliance would be improved if the sign explained the purpose of registration and use of the information. Wenger (1964) found that signs without explanation elicited more

"junk" (nonsensical lines, lewd comments, etc.), which may have been due to a lack of understanding of the purpose of registration. Users apparently do not reread the sign on each visit, so it is critical that the message be effective on the first reading. When registration is voluntary, most visitors will register if they believe it is worth their time and effort.

## Station Condition

The effect of poor maintenance of registration facilities is unknown, but it is probably significant in reducing the registration rate. Lack of supplies, such as pencils and cards, will prevent users from complying and will give visitors a negative impression of the managing agency's data collection effort. In the absence of supplies, some visitors have tried to register by using their own pencils and scraps of paper (Lucas 1983).

## Registration Card Design

The visitor registration cards, which are standardized and used nationally, may contribute to poor registration rates and inaccurate information. The card can confuse visitors because of awkward questions and small print size (fig. 1). In addition, some of the questions may be irrelevant to the specific wilderness and the manager's interests.

Many visitors fill out only the first few lines of the registration card. Therefore, the most important information—party size, length of stay, and destination—should be asked before name and address (questions 1 through 3 on the card). Then, even partially filled-out cards will supply the most vital information. If the geographical distribution of the visitors is needed, visitors could supply their Postal Service ZIP Code near the end of the card. The standard form asks visitors "location of entry point" (question 7). Stamping the name of the trailhead on the card would eliminate visitor responses such as "here" and ensure that the entry point is correct.

Question 12 asks visitors "number of watercraft or vehicles." This is inapplicable to most wildernesses and should be eliminated where inappropriate. Allowing managers to design their own registration cards would enable them to ask relevant questions and would minimize visitor annoyance.

Half of the registration card is devoted to the visitor's travel plan (question 13). Visitors are requested to code their travel zones from a map that is not present at trailheads. The visitor may therefore infer that the agency is not seriously collecting data. As a result, most visitors do not fill out half of the card. This section of the card could be eliminated. If travel information is desired, it may be gathered more accurately by wilderness rangers through conversations at trailheads, along trails, or at campsites.

Removing the travel information, rewording or eliminating awkward questions, and allowing managers to incorporate questions more relevant to their wilderness would greatly improve the registration card. The most important questions should be answered first. All questions should be printed in a large block type for easier



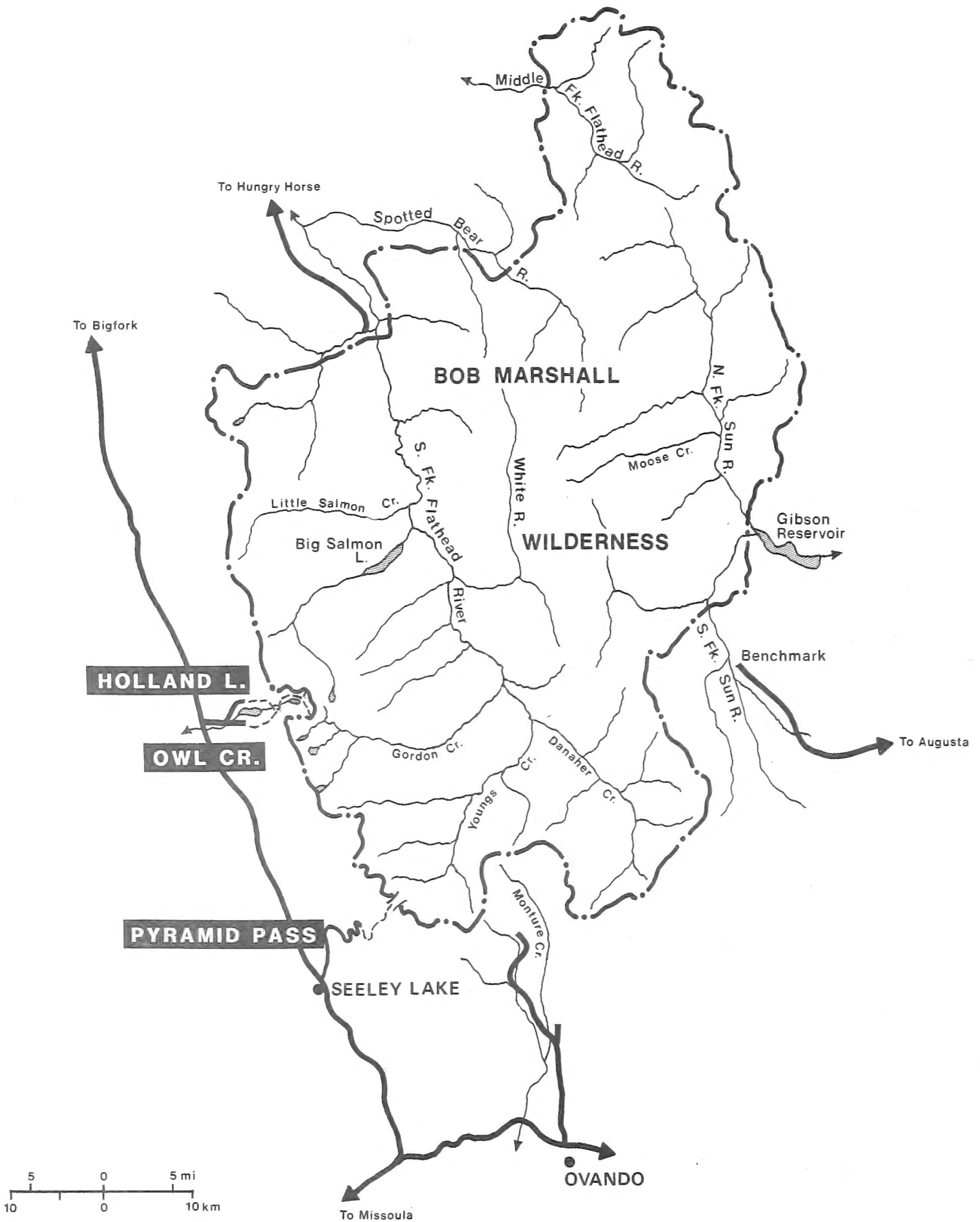


Figure 2.—Bob Marshall Wilderness.



## Selection of the Signs

Two signs were evaluated: the Forest Service sign currently in use, which served as a control, and an experimental sign developed especially for this study (fig. 3).

For the experimental sign, a high-visibility orange and black design was developed in cooperation with a local wilderness user group and the Missoula Equipment Development Center. The sign selected depicts both horse and hiker parties registering (fig. 3). This picture appeals to all types of users and provides a nonverbal message to parties actually registering. The main caption (the first third of the sign) reads: "One person from each party please register here when entering this area." The last part of the sign reads:

"We need your help to:  
Plan trail & campsite maintenance  
Measure use & effect  
Plan management budgets."

## Station Locations

Two locations for sign placement were tested: (1) the current location at or close to the trailhead, and (2) a site 1 to 3 miles (1.6 to 4.8 km) up the trail. The actual selection of the up-trail location depended on factors such as the registration station's placement on the trail, secondary conditions at the location, trail tread conditions, and local attractions such as scenic vistas.

## Field Procedures

Three sign and location combinations were tested for their potential to improve registration rates. They were compared against the control, the original registration station at its original location (OSOL). The three combinations tested were the original registration station at a new location 1 to 3 miles (1.6 to 4.8 km) up the trail (OSNL), the new registration sign located at the original location (NSOL), and the new registration sign at the new location 1 to 3 miles (1.6 to 4.8 km) up the trail (NSNL).

The Holland Lake trail, Owl Creek trail, and Pyramid Pass trail were selected as study sites. The trails received some of the highest use (Lucas 1983), their locations minimized study travel costs, and users included a high percentage of horsemen (fig. 2). Owl Creek attracts a high proportion of outfitters who were excluded from the study because they file trip plans with the Forest Service and are generally not expected to register.

In order to determine the success of any of the sign and location combinations, it was decided that the minimum useful compliance rates would be 60 percent for private overnight hiker parties and 50 percent for overnight horse parties. With such rates, and in conjunction with knowledge of the different user groups' registration rates, expanded data should be acceptably reliable. Any combination that provided these compliance rates would be viewed as successful.



Control Sign



Experimental Sign

Figure 3.—Control and experimental signs.

The study period began June 30 and ended October 20, 1982. This time period was blocked into two periods using August 15 as the midpoint so that each of the combinations would be replicated. Within a block, the four combinations were randomly assigned to four time intervals, ranging from 10 to 14 days. The combinations did not occur concurrently on any of the trails and were never placed back to back, which would have resulted in one combination running for 20 to 28 days. Each time interval included weekends or holidays when peaks in visitor use were expected. Because visitor awareness of the project could affect registration behavior, days on which the signs were to be changed or relocated were scheduled for the middle of the week when there were fewer visitors.

## Data Collection

Private party registration was determined by comparing registration cards and outfitter schedules against a photographic record that recorded actual use and registration behavior. The registration cards and outfitter schedules were tabulated simultaneously with the film to minimize confusion resulting from inaccurate information. This worked better than tabulating each separately. Registration cards were used to verify parties registered. Outfitter schedules were used to help identify and eliminate nonregistering commercial parties from the data.

The film record was obtained from a camera system developed by the USDA Forest Service Equipment Development Center in Missoula, MT (Gasvoda 1978). An electronic trail traffic counter and camera were affixed to trees 25 to 40 yards (23 to 36 meters) back from the registration station. When the traffic counter infrared beam was broken by a visitor, the camera was triggered to expose two frames. At the 2-mile (3-km) location on Pyramid Pass, placement and camouflage problems prevented focusing on the registration station. At this location, the camera was moved about 100 yards (91 meters) down the trail. Visitors could be counted on their way up to the station, but registration behavior could not be observed and was inferred.

## RESULTS AND DISCUSSION

Registration rates were influenced by location of the registration station when all trails and user groups were considered together (table 2). Moving the control sign from the trailhead to a new location up the trail almost doubled the registration rates. The experimental sign, when located up the trail, resulted in a registration rate of 69 percent, compared to 50 percent at the trailhead. For signs at the farthest location, compliance rates were 60 percent for the control sign and 69 percent for the experimental sign. This difference is small, and is the only comparison that is not highly significant statistically (table 2). Registration rates must be examined separately by user groups, however, before a decision to develop a new sign for up-trail locations can be made.

When data from all three trails were combined, and the different types of user groups separated out, the new sign farther up the trail ranked first for all users except day horse riders (table 3). The day horse-user category had so few observations that it was difficult to judge which sign and location combination worked best with this type of visitor.

### Day Hikers

Day hikers responded very well to both signs located up the trail. The new sign received 65 percent compliance while the old sign received 64 percent. Location influenced the day hiker's registration rate more strongly than either sign design. The new sign at the trailhead did not elicit a high registration rate (44 percent), although this was almost twice the rate for the old sign at the trailhead. Day hikers may not consider themselves as wilderness visitors and may not feel motivated to register at the trailhead for this reason. For this group, seeing the registration station farther in the wilderness may indeed symbolize wilderness entry (Lucas and Kovalicky 1981), and they respond favorably to registering. Of course, some day hikers may never reach the registration station if it is located far up the trail, but other monitoring techniques can be used to measure this use if it is important.

**Table 2.**—Combined registration data from Pyramid Pass, Owl Creek, and Holland Lake trails<sup>1</sup> for all visitor types

| Item                 | Treatment A       | Treatment B       | Treatment C       | Treatment D       |
|----------------------|-------------------|-------------------|-------------------|-------------------|
|                      | OSNL <sup>2</sup> | OSOL <sup>2</sup> | NSNL <sup>2</sup> | NSOL <sup>2</sup> |
| Number of parties    | 110               | 198               | 135               | 130               |
| Number registered    | 66                | 64                | 93                | 65                |
| Percent registration | 60                | 32                | 69                | 50                |

<sup>1</sup>Statistical significance, tested by  $\chi^2$ :

1. Old sign by location (treatments A and B) ( $\chi^2=22.2$ ,  $df=1$ ,  $p<0.001$ )
2. New sign by location (treatments C and D) ( $\chi^2=9.8$ ,  $df=1$ ,  $p<0.005$ )
3. Old location by sign (treatments B and D) ( $\chi^2=10.3$ ,  $df=1$ ,  $p<0.005$ )
4. New location by sign (treatments A and C) ( $\chi^2=2.1$ ,  $df=1$ ,  $p<0.20$ ).

<sup>2</sup>OSNL = old sign, new location  
 OSOL = old sign, old location  
 NSNL = new sign, new location  
 NSOL = new sign, old location.

**Table 3.**—Total number of parties and percentage registration by type of user group for three trails combined<sup>1</sup>

| Sign treatment | Overnight      |          |                |          | Day            |          |                |          |
|----------------|----------------|----------|----------------|----------|----------------|----------|----------------|----------|
|                | Hikers         |          | Horse          |          | Hikers         |          | Horse          |          |
|                | No. of parties | Per-cent | No. of parties | Per-cent | No. of parties | Per-cent | No. of parties | Per-cent |
| OSNL           | 40             | 83       | 20             | 20       | 42             | 64       | 8              | 25       |
| OSOL           | 60             | 57       | 5              | 20       | 124            | 23       | 7              | 0        |
| NSNL           | 52             | 88       | 41             | 56       | 31             | 65       | 7              | 14       |
| NSOL           | 38             | 76       | 20             | 45       | 57             | 44       | 11             | 9        |

<sup>1</sup>Statistical significance, tested by  $\chi^2$ :

1. Overnight hikers by treatment ( $\chi^2=16.9$ ,  $df=3$ ,  $p<0.001$ )
2. Overnight horse by treatment ( $\chi^2=8.3$ ,  $df=3$ ,  $p<0.04$ )
3. Day hikers by treatment ( $\chi^2=34.4$ ,  $df=3$ ,  $p<0.001$ )
4. Day horse by treatment (NA).

## Overnight Horse Users

Overnight horse users responded well to the new sign farther up the trail, with a 56 percent registration rate. The old sign up the trail did not do as well (20 percent). The old sign at the trailhead also elicited only 20 percent compliance from a small sample, compared to 45 percent for the new sign at the trailhead. Registration rate is clearly affected by design of the station for this particular user type.

## Overnight Hikers

Overnight hikers had the highest registration rates of any user group. Eighty-eight percent complied with the new sign up the trail, with 83 percent registering at the old sign in the same location. Even the two sign combinations at the trailhead received acceptable registration rates. Seventy-six percent registered at the new sign and 57 percent complied at the original sign. With only 5 percent difference between the two best ranked combinations, it appears that location is a more important factor than design in attracting better registration rates from overnight hikers.

## CONCLUSIONS AND MANAGEMENT IMPLICATIONS

For all user categories, it is interesting that the old sign and trailhead location ranked last. Any modification of the current system appears to improve visitor compliance, and the best system, the new sign at the new location, was over twice as effective as the current system. Perhaps visitors noticed more managerial interest reflected in station maintenance, which improved their perception of the usefulness of the information they provided. The new sign was more visible and simply may have attracted more attention. Location, however, generally appeared to have the strongest influence on compliance.

Location is clearly important for achieving useful registration rates. Locations up the trail may elicit desired response because visitors are now ready to stop. This highlights how important location choice is when establishing sites. Visitors also may have discharged

some of the pretrip energy and can now think of other things besides loading up and getting on the trail.

The sign and its message influenced visitor registration, but not generally as strongly as location. It appears the brief "please register" is almost as effective as the more detailed message, perhaps because visitors were ready to register. Nevertheless, the importance of the message and sign design cannot be underestimated, because user groups respond differently. For example, the new sign up the trail received a 56 percent registration rate from overnight horse users. This is 36 percent higher than that from the old sign in the same location, and may result from horse users identifying with the horse user in the picture, as suggested by the relatively high rate for the new sign at the old location. Improving the rate to 56 percent can be valuable to managers. At this level, expanding the use figures can produce acceptably reliable estimates suitable for workload planning.

By manipulating sign and location, overnight hikers, overnight horse users, and day hikers were induced to register at rates sufficient for reliable use estimates. The small sample of day horse users responded poorly, and thus their significance in the visitor impact pattern must be examined. During the entire study period, day horse parties accounted for less than 6 percent of the visitor parties. At such low percentages, managers may decide to gain information about them through other monitoring techniques. Cameras, field counts, and the like, are all useful alternative methods to registration stations, and may provide cheaper, more useful information. Conversely, hikers comprised 77 percent of the observed visitor parties, over half of which were day users. Failure to register half of this group would be a serious loss of data.

If registration stations are to be used, one must allow sufficient time to select good sites. Many factors, large and small, must be considered. For this study, two people spent a half day examining possible sites and selecting the best one. A good site, located farther up the trail than a poorer one, may cost more to service, but may be worth it in better information produced. Perhaps not all trails need registers, at least for use measurement. Registers placed along a few high-use trails may be all that is needed to learn about most of the visitors to the area.



Selecting a good trail registration site is judgmental, but the following criteria are suggested for site selection:

1. Is this a site where most users would be likely to catch their breath or adjust saddles?
2. Does the site offer a point of interest, scenic view, or stream crossing where most visitors would naturally stop?
3. Can horse users stop safely in the trail? Is the trail narrow enough that a pack string can be contained?
4. Can the station be serviced with a reasonable expenditure of time and money?
5. Is the location far enough up the trail that pack strings will be settled down and easy to control?
6. Does the registration station stand away from other signs, such as directional pointers, that may distract the visitor from the registration message?
7. Can the sign be seen easily by approaching visitors who are unfamiliar with the area?

This study examined three trails in the Bob Marshall Wilderness. The trails are typical of wilderness trails with substantial horse and hunter use; therefore, the results probably would be generally similar elsewhere, at least in relative effectiveness of the alternative signs and locations. Although the results must be extrapolated with caution, one can safely conclude that compliance may be improved by simply selecting better locations for trail registers. In this study, relocating the registration station resulted in a 56 percent registration of the horse users, 88 percent of the overnight hikers, and 65 percent of the day hikers. These rates allow useful and reasonably reliable expansion of the data. Depending on the type of information managers are seeking, trail registers still constitute an effective means of gathering information about users and their use patterns.

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Four combinations of sign and location were studied on three trails in the Bob Marshall Wilderness, MT, to determine effect on visitor registration rates. Registration rates generally improved, and for some classes of visitor doubled, when the station was moved 1 to 3 miles up the trail from the trailhead. Sign message, though less influential than location, significantly raised registration rates for some visitors. Registration stations should be located where it is convenient for visitors to stop along the trail.

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**KEYWORDS:** registration, compliance, trail registers

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The Intermountain Station, headquartered in Ogden, Utah, is one of eight regional experiment stations charged with providing scientific knowledge to help resource managers meet human needs and protect forest and range ecosystems.

The Intermountain Station includes the States of Montana, Idaho, Utah, Nevada, and western Wyoming. About 231 million acres, or 85 percent, of the land area in the Station territory are classified as forest and rangeland. These lands include grasslands, deserts, shrublands, alpine areas, and well-stocked forests. They supply fiber for forest industries; minerals for energy and industrial development; and water for domestic and industrial consumption. They also provide recreation opportunities for millions of visitors each year.

Field programs and research work units of the Station are maintained in:

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Logan, Utah (in cooperation with Utah State University)

Missoula, Montana (in cooperation with the University of Montana)

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