A SAMPLING SYSTEM TO MEASURE THE AMOUNT AND LOCATION OF BACKCOUNTRY DAY USE WITHIN YELLOWSTONE NATIONAL PARK

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This is a report on a pilot study conducted in Yellowstone National Park during July and August of 1977. The overall objective was to obtain data necessary to the development of a recommended sampling scheme for a comprehensive study of backcountry users in Yellowstone.

Study Objectives

1) To apply and test the effectiveness of several different direct trail use sampling methods, specifically trailhead parking lot inventories, photo-electric trail traffic counters, and remote time-lapse recording cameras.

2) To estimate relative levels of use for the specified trails (where possible), and identify any special characteristics associated with individual trails concerning level, timing, and activity types of users.

3) To determine if any trails can be excluded from further consideration because of negligible day use on these trails.

4) To identify trails (if any) that receive a very homogenous type of trail user and/or backcountry areas that provide rather homogenous activity opportunities.

Methods

The pilot study involved the employment and testing of several different sampling procedures. Trailhead parking lot vehicle inventories, photo-electric trail traffic counters, and remote self-activating time lapse

cameras were all investigated as to their practicality and effectiveness as techniques (individually and in various combinations) to day use of Yellowstone backcountry.

Trails recommended for study were selected in consultation with Park Service Personnel and were separated into two groups. Those trails which had distinct, single purpose trailhead parking lots were geographically grouped and sampled through systematic vehicle counts at the respective parking lots. Those trails that did not have trailhead parking lots, or which started from parking lots associated mainly with other attractions were sampled using trail traffic counters. The time lapse cameras were used on both trailhead parking lots and on suitable stretches of actual trails.

Results

The photo-electric trail traffic counters performed well during the study period. The counters operated without problems 94% of the set up time. On-trail observations of visitor type (overnight vs. day use) and travel route are necessary to correct the "raw" non-directional counts recorded on the counter. The time-lapse camera can be used as a data collection device in situations where the appropriate field of coverage can be obtained. The cameras can be used to record counts, direction of travel, and in some cases it was possible to determine type of user. The most effective use made of the cameras was in monitoring parking lots where vehicle counts, length of stay and use by time of day were recorded.

The trailhead parking lot car count by personal observation was successful in generating data for estimates of relative use levels on many trails. However, the costs of this method, both direct travel costs and travel "time" costs (time which could be spent in on-trail observation), hinder the usefulness of this sampling method in a study area as large as Yellowstone Park.

All calculations pertaining to level of use, length of stay and other user characteristics were designed to provide information for the design of a comprehensive sampling plan. Calculations for individual trails are based on a non-random sample of less than three days out of the entire summer, which didn't provide sufficient data to calculate statistical inferences on the reported values. However, conjectures which are suggested from Tables 1, 2 and 3 are:

1. The sampling techniques are not significantly different in the determination of use levels.

2. A sample size of 10 days of interviewing on a given trail is required to be able to estimate the magnitude of use to within $\pm$ 10%.

3. A sample size of 10 days of interviewing on each trail should provide estimates of the percentage of users in each category (ie fishermen, sightseers, etc.) which are accurate to within ± 5% on the heavy use trails down to ± 20% on the light use trails. Less than 10 days of interviewing on the trails will probably lead to estimates with high variance and which are of doubtful value.

Recommendations

This study was the first phase of a two-part study. The results of the study have provided the data necessary to proceed with the second phase.

A research proposal is being prepared in conjunction with Yellowstone Park research personnel to carry out the second phase. The second phase of the study will consist of a survey of backcountry users, based on the sampling scheme developed from this past year's work for purposes of determining the total number of individuals using selected backcountry trails, use by individual trail, type of user (overnight or day use), primary activity interest and attitudes backcountry users hold toward various aspects of Yellowstone backcountry. A more detailed analysis and discussion of the results of this year's work appears in a thesis that was produced as a part of the study.

Cleary, P. R., 1978. A Recommended Sampling Procedure For Studying Backcountry Use in Yellowstone National Park, Unpublished Master's Thesis, University of Wyoming, Laramie, Wyoming.

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Table 1. Comparison of Different Estimate Procedures - Average Number of Day Use Parties Per Day, Yellowstone National Park, July-August, 1977

Trailhead	Parking Lot Count Estimate	Camera Data Estimate	Trail Counter Estimate
Grebe Lake	4.9 parties/day	5.8 parties/day	5.5 parties/day
Cascade Lake	9.9 parties/day	7.6 parties/day	10.7 parties/day
Pelican Creek[a]	11.6 parties/day	9.0 parties/day	11.7 parties/day
Pelican Creek[b]	n.a.	2.8 parties/day	3.2 parties/day
Cascade Lake	n.a.	6.1 parties/day[c]	7.4 parties/day
Slough Creek	4.9 parties/day	4.4 parties/day	n.a.
Soda Butte	6.3 parties/day	6 parties/day	n.a.
Lone Star Geyser	21 parties/day	11.6 parties/day	n.a.

[a]After fishing season opened (August 1)
[b]Before fishing season opened
[c]Camera was positioned on trail rather than parking lot

Table 2. Average Day Use Party Size, Yellowstone National Park, July-August, 1978

Trailhead	Average Party Size - People Per Party (Personal Observation-10 or more parties/trail)
Wraith Falls	3.8
Mystic Falls	3.6
Grebe Lake	3.6
Wapati Lake	3.2
Artist Point	3.1
Cascade Lake	3.1 (Film)
Clear Lake	3.0
Soda Butte	2.9
Lone Star Geyser	2.9
Grizzly Lake South	2.8
Pelican Creek	2.8
Cascade Lake	2.6
Trout Lake	2.6
Riddle Lake	2.4
Riddle Lake	2.4 (Film)
Blacktail Ponds	2.4

Average Day Use Party Size
(All Trails - all personal observations) = 2.7 people per party

Average Fishing Party Size
(All Trails - all personal observations) = 2.4 people per party

Average Overnight Party Size
(All trails - all personal observations) = 2.2 people per party

Table 3. Trail Ranking by Average Number of Day Use Parties Per Day, Yellowstone National Park, July-August, 1978

Trailhead	Average No. of Day Use Parties Per Day	Data Source
Mystic Falls	39	(TC)
Artist Point	35	(TC)
Sentinal Meadow	21.9	(PL)
Wraith Falls	16.5	(TC)
Elephant Back	14.7	(TC)
Wapati Lake	12.2	(PL)
Pelican Creek	11.7	(PL)
Fairy Falls	10.7	(PL)
Cascade Lake	10.7	(TC)
Trout Lake	10.0	(TC)
Clear Lake	9.0	(TC)
Lone Star Geyser	8.4	(Cmr)
Mallard Lake	8.0	(TC)
Beaver Pond Loop	8.0	(TC)
Yellowstone River Bridge	7.9	(PL)
Cascade Lake	7.4	(TC)
Riddle Lake	7.0	(Cmr)
Heart Lake	6.9	(PL)
Garnet Hill	6.8	(PL)
Nez Pierce	6.3	(PL)
Grebe Lake	6.3	(PL)
Grizzly Lake South	6.2	(PL)
Soda Butte	6.0	(Cmr)
Shoshone Lake	5.4	(PL)
Suspension Bridge	5.2	(PL)
Slough Creek	4.9	(PL)
Delacy Park	4.9	(PL)
Cub Creek-Clear Creek, East	4.9	(PL)
Blacktail Ponds	4.7	(TC)
Seven Mile Hole	3.7	(TC)
Fern Cascades	3.5	(TC)
Panther Creek	3.0	(PL)
Bunsen Peak	3.0	(PL)
Cub Creek-Clear Creek, West	3.0	(PL)
Grizzly Lake, North	3.0	(PL)
Eagle Nest Rock	3.0	(PL)

(PL) - Parking lot car counts
(TC) - Photoelectric trail traffic counter
(Cmr)- Time-lapse camera