Trap shyness in onsite visitor surveys; evidence from the U.S.

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Abstract — In onsite surveys of visitors, whether the purpose is estimating visitation volume or characteristics of the visit population, those who visit the area multiple times per year are candidates to be surveyed more than one time. In such surveys, each visit represents a unique sampling unit. However, individuals may be unwilling to be surveyed after the first contact. The phenomenon is similar to 'trap shyness' in wildlife studies wherein an animal learns to avoid traps after the initial experience. If trap shyness exists, it has the potential to bias the results for either or both visitation estimation or describing the average visit characteristics.
There is some anecdotal evidence that trap shyness does exist, and could be problematic for long-term surveys such as the National Visitor Use Monitoring program used by the US Forest Service. This paper describes the conceptual framework for how trap shyness can affect both visitation estimates and visit characteristics, identify empirical hypotheses to be tested that provide evidence of trap shyness, present results for the hypotheses, and describe possible improvements to sampling processes that could determine it existence and extent.
Data for the paper come from onsite surveying collected during the period October 2004 – September 2007 for about three dozen National Forests.

Index Terms — Estimation bias, onsite surveys, recreation visitation, trap shyness.

1 Introduction

Studies whose purpose is estimating the amount of visitation to a park, protected area, or recreation area generally follow a conceptually consistent estimation process. The area is divided into sampling units defined spatially and temporally. Mechanical counts of traffic are taken from a sample of the units via photographs, infrared or pneumatic counters, observation, or some similar method. Coefficients to calibrate the counts to visitation estimates are obtained through surveys, interpretation by trained staff, or onsite observation. In the U.S., a very common protocol is the combination of mechanical counts of auto traffic calibrated with onsite surveys.

Similarly, studies that seek to describe visitor characteristics usually have temporally and spatially defined sampling strata. Onsite interviews are conducted over a number of days. Characteristics of the population of visits are derived from the sample of individuals obtained.

For both types of studies, a unique element in the population of individual contacts occurs each time a person or vehicle passes the traffic counter or interview site. That is, each such passage is an opportunity to capture and record the person's behaviour with the survey instrument. However, anecdotal evidence indicates that individuals who have been 'captured' once are less likely to be willing to submit to subsequent interviews.

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Research that estimates the size of wildlife populations through capture-recapture studies has identified learned behaviour in animals that makes those once captured more likely to be recaptured or to avoid recapture. Animals that seek recapture are referred to as 'trap-happy', and those who avoid it are 'trap-shy'. These learned behaviours yield biased estimates of population sizes if not corrected in the analysis [1], [2].

This paper posits that a trap-shyness phenomenon exists in onsite surveys of visitors to recreation areas. Trap shyness can be considered as a form of self-selection bias in respondents, in that once a person has been 'captured' during the interview season, their willingness to participate on subsequent visits is less. The paper explains the effects of trap shyness on estimating visitation volume, and on characteristics of the visit population. Several measures that could indicate the presence of trap shyness are presented, and results from data collected in year-long interview windows form several National Forests are presented.

2 Trap shyness effects

2.1 Visitation Estimation

Let T = the estimate of traffic obtained by the traffic counter, and p = the proportion of the surveyed individuals who are completing a recreation visit. The visitation estimate, V, is:

$$V = T * p \quad (1)$$

In general, if trap shyness exists among recreation visitors, then p will be biased downward, and the visitation estimate will be too low. Surveys conducted later in the data collection time window will not include all of the recreation visits. Moreover, the bias may be greater if the proportion of visits made by people making repeat visits is higher.

2.2 Visit characteristics

A primary effect of trap shyness will be to underestimate the concentration of visits made by frequent visitors. Further, if visit frequency is correlated with a given characteristic, then the existence of trap shyness can lead to an underestimate of the proportion of visits made by people with that characteristic. For example, in the U.S., men are more likely than women to be frequent users of wildland recreation areas, and locals visit more frequently than non-locals.

2.3 Endogenous stratification

A curious side note is that trap shyness would appear to counter some of the effects of endogenous stratification for studies that were designed to sample or describe the population of visiting individuals. For example, in studies of consumer surplus for recreation, endogenous stratification can be a problem, because those persons who visit more frequently are more likely to be surveyed once (or more) than are those who visit less frequently [3]. However, trap shyness would eliminate the chance that a particular person will show up in the onsite sample multiple times.

3 Evidence of trap shyness

What would we expect to see if trap shyness exists in the population of potential survey respondents? First, we would expect to see a lower incidence of frequent visitors in the population of sampled recreation visitors as we progress through the time window of sampling. To the extent that frequent visitors return to the same location on the forest to recreate, we could expect to see a lower percentage of frequent visitors on sample occasions when we revisit a survey location.

We also expect that a greater proportion of the onsite contacts would decline to be interviewed over time, since they had already been 'captured' in the survey process.

Data for the study came from year-long

onsite surveys conducted on three National Forests through the National Visitor Use Monitoring program. We selected the three forests sampled between 2004 and 2007 that had the highest estimated proportion of visits made by visitors who reported visitoing at least 50 times per year. We assumed that the effects of trap shyness would be most evident on those forests. The forests selected were the Lolo (in Idaho), Sawtooth (Idaho), and Tahoe (California). For the Lolo, we estimate that about one-third of all recreation visits are made by individuals who visit at least 50 times per year; for the other two forests, the figure is about 23 percent of visits.

4 RESULTS

For two of the three forests, the percentage of survey respondents who were frequent (>50 visits/year) visitors generally declined over the sampling year (Table 1). For the Lolo NF, the percent of contacts who were frequent visitors declined steadily each successive quarter of the sampling year. On the Sawtooth NF, the percentage of frequent visitors was much less in the second half of the sampling year. For the Lolo, about 28 percent of respondents were frequent visitors on the first day of sampling at a site. On later sampling efforts at the same locations only 21 percent of contacts were frequent visitors.

TABLE 1.

PERCENT OF RECREATION SURVEY RESPONSES REPORTING 50 OR MORE VISITS PER YEAR, FOR THREE NATIONAL FORESTS

Quarter of Sampling year	Lolo N.F.	Sawtooth N.F.	Tahoe N.F.
1 (Oct – Dec)	30	22	17
2 (Jan – Mar)	28	19	12
3 (Apr – Jun)	26	6	19
4 (Jul – Sep)	12	10	12
First day at sample location	28	12	16
Later days at same sample location	21	13	15

On the Lolo, the recreation contacts who reported visiting the forest at least 200 times per year made up about five percent of the contacts on the first day of sampling at sites, but only about 1 percent for subsequent days at those same locations.

There was no consistent pattern over the quarters of the sampling year regarding the percentage of survey contacts who agreed to be interviewed (Table 2). For the Tahoe NF, the percentage who agreed to be interviewed was slightly higher in the last three quarters of the year than in the first. On the Sawtooth, the percentage who agreed to be interviewed was lower in the second half of the sample year.

However, on second and later sample days at sample sites, the percentage of onsite contacts who agreed to be interviewed were 10 percent lower on the Lolo than on the first sample day at those sites. For the Sawtooth, the percentage who agreed to be interviewed declined from 88 percent on the first day at sampled sites to 84 percent on succeeding days

TABLE 2.

PERCENT OF ONSITE CONTACTS WHO AGREED TO BE INTERVIEWED, FOR THREE NATIONAL FORESTS

Quarter of Sampling year	Lolo N.F.	Sawtooth N.F.	Tahoe N.F.
1 (Oct – Dec)	88	91	91
2 (Jan – Mar)	71	98	96
3 (Apr – Jun)	80	83	97
4 (Jul – Sep)	87	83	97
First day at sample location	87	88	96
Later days at same sample location	77	84	96

5 DISCUSSION

These preliminary results show some evidence that trap shyness may exist in the sample population for the Lolo NF, but only very limited evidence that it is evident for the sam-

ple populations on the other two forests. In particular for the Lolo, we see that the proportion of frequent visitors is less in later quarters of the sample year. As well, on the second or later sample days at a site, both the percentage of contacts who agree to be interviewed, and the percentage of recreation visitors who are frequent visitors are lower than on the first day that sampling occurs there.

For the Lolo, visit frequency is correlated significantly and negatively with both visit duration and distance travelled to the forest, but not with gender, age, or racial characteristics. So trap shyness would lead to underestimating the proportion of local residents who recreate on the forest, and overestimating the average visit duration.

It is worth noting that for sampling on the Lolo, there were 16 locations that were each sampled 5 or more times during the sample year. For the Sawtooth, there were 12 such locations, and for the Tahoe, there were only eight. It may be that trap shyness is more evident in an onsite sample that contains a higher proportion of repeat locations in the set of sampled days.

The examinations performed here cannot provide definitive evidence that trap shyness exists in the population of visiting individuals. Rather, they can only provide indications that it may exist. It is very possible that those who have been sampled once in the process may choose to not even be contacted in the rest of their visits. That is, they may just pass by the interview location without stopping to allow the interviewer to ask if they would be willing to participate in the interview.

Definitive evidence for the existence and degree of trap shyness would best be determined by incorporating a mandatory traffic stop as part of the survey protocol. Currently, the Forest Service's Visitor Use Monitoring program has only a voluntary traffic stop. That is, individuals or vehicles passing by the interview location are not required to stop for an interview. In addition, for those who decline an interview it would be helpful to ascertain if the reason for refusal is that the individual had been surveyed before during the process. Those interviewed for the first time could be asked if they felt they would be any less likely to stop for an interview on succeeding visits to the forest.

6 Conclusion

Trap shyness in onsite recreation surveys is a form of self-selection bias. It would seem to be most likely at recreation areas that have high levels of repeat visitors. Popular day use sites, dispersed trailheads, or similar places where the same individual may visit several dozen times a year would have the greatest potential. Its effects could be limited in onsite surveys that have shorter sampling windows, or that do not revisit the same sampling location multiple times.

Research on trap shyness in onsite recreation samples is difficult to find. This paper was motivated by discussions with field interviewers at the end of the sampling year, who noticed that frequent visitors chose not to be interviewed more than one time. Additional research is needed to develop a definitive set of tests and identify the necessary data to evaluate and correct for trap shyness.

References

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