



Research Note

A simple method for monitoring dog leash compliance behavior in parks and natural areas



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ABSTRACT

This article presents a monitoring protocol for dog leash compliance designed with public participation, mobile technology and flexible platforms in mind. We describe the protocol development and illustrate data utility by comparing results across three trail surface types. Implemented at an urban nature park in North Carolina, pilot tests indicated a high level of inter-observer reliability ($> 86\%$) for all variables. The consistency was improved further by refining the measures and the observation procedure. A total of 169 dogs were observed during the study period with an overall compliance rate of 87%. Significantly lower compliance was found on the woodchip and unpaved trail sections (71–74%) than the paved section (99%). Our results suggest this approach may serve as a reliable protocol for monitoring a common and important impact issue. Lessons learned are shared to stimulate further advancements and applications of technology in participatory monitoring of this and other indicators of sustainable recreation.

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1. Introduction

1.1. Problem statement

As the significance of parks, protected areas and open space (parks hereafter) in addressing societal issues such as connecting humans with nature and physical health is increasingly recognized, many parks are experiencing increasing visitation, especially urban and exurban parks near population centers. Balancing recreation demand with other ecosystem services of parks requires timely information on visitor use and behavior that has ecological ramifications. Unfortunately, sustained monitoring of visitor use and the associated impacts is the exception rather than the rule in many parks where limited staff and budget constraints coincide with high volume of use. Participatory monitoring, such as involving locals or visitors in collecting visitor impact data, may provide a viable solution by taking advantage of rapid technological advancements in recent years (Miller, Leung, & Lu, 2012; Ricker, Johnson & Sieber, 2012).

This paper reports part of a larger project in which protocols for visitor impact monitoring were developed with public participation in mind. The project started with manager interviews to identify the most salient visitor impact issues, for which indicators and participatory monitoring methods are developed. This paper

focuses on one of the three key indicators, non-compliance with dog leash regulations, which was identified as a common visitor impact issue of significant managerial concern (Taylor, Anderson, Taylor, Longden, & Fisher, 2005). Park management must consider environmental and social effects of dogs, especially when they move beyond the designed infrastructure or do not comply with rules intended for resource protection or visitor experience. Specifically, managers need to understand the extent, pattern and nature of noncompliance behavior of unleashed dogs in parks in order to select effective strategies and actions to minimize this behavior and associated adverse environmental and social effects. While scientific research on the ecological effects of dogs in parks exists (Taylor et al., 2005; Weston, Fitzsimons, Wescott, Miller, Ekanayake, & Schneider, 2014), we could not identify any published monitoring protocol to address the information need for this management problem.

1.2. Past research

Dogs are very common “visitors” to parks in North America and around the world (Weston et al., 2014). A Gallup poll in 2006 reported that 42% of people in the United States owned a dog, and about 70% of dog owners walked their dog at least once a day for an average of 17 min (Newport, Jones, Saad, & Carroll, 2006). Meanwhile, India had the fastest growing dog ownership population in the world with a 58% increase of dog ownership between 2007 and 2012 (Bradley & King, 2012). Surprisingly, the impact of dogs on parks has not received much research attention and only a

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few published studies were identified on the issue (Weston et al., 2014).

When people walk dogs in natural or protected areas, exposure to wildlife is inevitable (Taylor et al., 2005), while other ecological effects such as vegetation trampling and altered soil conditions may also result (Shaw, Lankey, & Hollingham, 1995). Usually in delicate areas, managers ban dogs to prevent damage to native species or habitat. Harsh management approaches can trigger anger in the communities of dog walkers. Lobbyists have argued that little is known about species to species interaction of dogs and native animals, so the policies have little scientific backing (Banks & Bryant, 2007).

Past research suggests that dogs affect wildlife in a variety of ways (Frid & Dill, 2002). Taylor et al. (2005) highlighted the effects of disturbance from dogs on the vigilance behavior of a range of species, with one important finding being that dogs running far from their owners have a greater disturbance on wildlife than humans on their own, or humans with dogs under close control. Lord, Waas, Innes, and Whittingham (2001) suggested that off-leash dogs may provoke a more pronounced response from birds than leashed dogs, and similar effects were found for mammals such as deer (Langbein & Putman, 1992).

Recent research has offered further empirical support of dogs' effects on wildlife. Banks and Bryant (2007) examined the effects of on-leash dog walking on birds at 90 different forested sites in Sydney, Australia. The results indicated that dog walking led to a decrease of 41% of bird species in the area, and a 35% decrease in species richness, with ground dwelling birds being the most affected species. When the experiment added more human walkers and no dogs to the forest, the response from the birds did not change. This suggests that the dog walkers, rather than just humans, affected the birds distinctively. Reduced activities of a variety of wildlife species, including mule deer, squirrels, rabbits, prairie dogs and bobcats, were also reported in areas where dogs are allowed in the City of Boulder Open Space and Mountain Parks in Colorado, USA, as compared to areas of the same park system where dogs were prohibited (Lenth, Knight, & Brennan, 2008). In contrast, Forrest and St. Clair (2006) and Reed and Merenlender (2011) did not find significant dog effects in their bird and carnivore studies.

In addition to ecological influence, the presence of dogs can cause social problems commonly found in parks. Managers must understand the issue from the perspective of visitors with dogs and those without, and assess the best restrictions to please park guests while also protecting the environment. Heywood and Aas (1999) looked at the behavioral problems found in the Norwegian mountains dealing with dogs and cross-country skiers. One of the most prominent problems that staff listed was skiing with dogs. In a more recent study in the City of Lyon, France, researchers examined the interactions of dogs and dog owners with other residents, including 27 variables and elaborate interaction measures (Gaunet, Pari-Perrin, & Bernardin, 2014).

Non-compliance behavior, such as littering, off-trail walking and dogs off-leash, is a common management challenge across different park settings, but it is a specific concern for natural areas because of the potential impacts on natural resources and visitor experience (Monz, Cole, Leung, & Marion, 2010). Past research on non-compliance behavior in outdoor recreation settings has largely focused on littering and off-trail walking behavior, and on the efficacy of behavior changing measures. In a study by Park, Manning, Marion, Lawson, and Jacobi (2008), off-trail behavior was recorded using observations by researchers and questionnaires distributed to park visitors. The study found that indirect management practices would not make a considerable impact on reducing the physical impact on the area surrounding the trails. Applying a normative approach, Kim and Shelby (1998) found that

informing visitors within natural areas of appropriate behaviors might encourage single- or no-tolerance norms. This, in turn, could possibly minimize the non-compliance within a protected area.

The need for more reliable and comprehensive visitor data has increased within natural areas managed by public agencies. A study by Cessford and Muhar (2003) examined the monitoring of visitors over time and space to help supplement the need for visitor monitoring data. The majority of past research has utilized survey research to assess socio-demographic variables, motivations, attitudes, perceptions, reported activities and reported behavior of visitors (Arnberger, Haider, Eder, & Muhar, 2010). However, information about non-compliance behavior may be difficult to obtain accurately from visitor surveys because of its socially undesirable nature. To obtain more valid non-compliance data, researchers have explored unobtrusive monitoring techniques such as behavior observations and image captures (Bradford & McIntyre, 2007; Waayers, Newsome, & Lee, 2006).

Advances in technology have led to innovative techniques for visitor monitoring (e.g. automatic counters, weather-based models applied to vehicle counters). The use of iPads and iPhones has not been widely discussed within the natural resources field, but innovative techniques could inspire greater use of these tools for visitor monitoring. Managers should be aware of new technologies to use with monitoring because of the opportunities and possible challenges that can be presented (Cessford & Muhar, 2003).

1.3. Study objectives

The objectives for this paper were to: (1) develop and test a protocol for monitoring compliance behavior with respect to dog leash regulations; and (2) demonstrate the utility of the monitoring data by comparing compliance behavior on different trail types.

2. Material and methods

2.1. Protocol development

This protocol was developed with several guiding principles in mind. The protocol should yield valid monitoring data that are directly relevant to manager decision-making. Data should be easy to record after quick training so multiple individuals, including managers, park interns, community residents or other volunteers, can help collect and report data. Multiple individuals need a high level of reliability of data collected so managers have confidence in using or defending the data. Finally, the cost for materials and resources to collect the data should be minimal.

After extended discussion with park managers as well as considerations of study location and existing methods, we developed a behavior observation form that included variables about dog and dog owner behavior with respect to leash compliance. We implemented this form on multiple, low-cost digital platforms, including iPads and smartphones. An identical form was also available as a traditional paper and pencil option. We chose to test the procedure on iPad and smartphone devices as they are increasingly accessible to park managers and community/park volunteers. Google Sites and Drive (<http://drive.google.com>) were chosen as the data archiving and management solution as these web-based programs have good operating and sharing functionality and they are free to the public. The spreadsheet on Google Drive can be populated from multiple devices such as iPads and smartphones in real time when there is mobile 3G/4G connection. We employed an iPhone/iPad mobile App named FORMS to collect

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