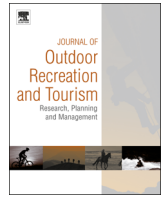




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Contents lists available at ScienceDirect

## Journal of Outdoor Recreation and Tourism

journal homepage: [www.elsevier.com/locate/jort](http://www.elsevier.com/locate/jort)

# An application of recreation resource assessment techniques to inform management action in an urban-proximate natural area



Ashley D'Antonio<sup>a,\*</sup>, Christopher Monz<sup>a</sup>, Nell Larson<sup>b</sup>, Amy Rohman<sup>a</sup>

<sup>a</sup> Utah State University, Department of Environment & Society, 5215 Old Main Hill, Logan, UT 84322, USA

<sup>b</sup> Swaner Preserve and EcoCenter, Utah State University, 1258 Center Drive, Park City, UT 84098, USA

## ARTICLE INFO

### Article history:

Received 17 June 2015

Received in revised form

2 March 2016

Accepted 1 April 2016

### Keywords:

Urban-proximate

Natural areas management

Recreation ecology

Interdisciplinary

Recreation management

## ABSTRACT

Urban populations in North America are increasing, putting added pressure on urban-proximate natural areas which provide urban residents with a natural location for respite and recreation. The application of traditional recreation management techniques – generally utilized in federally owned, public lands – can provide an understanding of the biophysical and social conditions of a natural area. In order to better measure both current biophysical and social conditions, set a baseline for future monitoring, and inform future management actions, an interdisciplinary approach was taken at the Swaner Preserve and EcoCenter in Park City, Utah. Trail assessments, visitor use estimations and social science visitor surveys were conducted to provide an understanding of recreation use. Results from the study indicate that despite high levels of use, trails on the Swaner Preserve are in a condition that is acceptable to managers; with the exception of a few locations where high levels off-trail use occurs. Visitors to the natural area, although mostly local, were largely unaware of the other interpretative and educational activities provided by the Swaner Preserve and EcoCenter. Results from the study led to various management and stewardship suggestions which were presented to the Swaner Preserve and EcoCenter managers. Managers utilized these science-based suggestions to make various management changes on the Swaner Preserve. Overall, traditional recreation management techniques can provide the baseline information that natural area managers need to begin long-term monitoring efforts in a reasonable amount of time with a relatively small staff.

## MANAGEMENT IMPLICATIONS

- The study presents recommendations for the management of urban natural areas characterized by an increasing year-round use and encroaching development.
- This comprehensive framework of a social-ecological approach that can be used by managers of smaller, local natural areas to balance dual missions of natural resource protection and managing for recreation use.
- The best management results can be expected when applying this social-ecological approach in a comprehensive manner while working closely with natural area managers.
- The approach presented in this study is (1) able to meet the specific needs and objectives of natural areas managers, (2) cost effective in terms of time and labor, and (3) can be easily replicated at other urban-proximate natural areas and/or be used for long-term monitoring.

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## 1. Introduction

Across North America, increasing urban populations have been identified as a primary stressor on urban-proximate ecological systems (Goddard, Dougill, & Benton, 2010). It is projected that by 2050, 89% of the population of North America will live in urban areas (United Nations, 2012). Recent studies have shown that

\* Corresponding author.

E-mail addresses: [ashleydantonio@gmail.com](mailto:ashleydantonio@gmail.com) (A. D'Antonio), [chris.monz@usu.edu](mailto:chris.monz@usu.edu) (C. Monz), [nell.larson@usu.edu](mailto:nell.larson@usu.edu) (N. Larson), [acrohman@mtu.edu](mailto:acrohman@mtu.edu) (A. Rohman).

natural areas provide protection for threatened ecological systems while simultaneously affording urban residents with a variety of benefits including improved physical and psychological health (Leung, Walden-Schreiner, Matisoff, Naber, & Robinson, 2013; Wolch, Byrne, & Newell, 2014). To be effective stewards of natural areas, managers must find ways to balance recreation use while simultaneously conserving resources thereby maintaining a healthy ecosystem. Natural areas that are urban-proximate may be particularly challenging to manage sustainably as they often receive high levels of recreational use year-round (Budruk, & Manning, 2003).

To properly protect natural resources, managers of natural areas must know the current status and condition of both natural and social resources. Understanding current conditions includes knowing the level of recreation disturbance, how much recreation is taking place, who is using the natural area for recreation, and what recreational activities are occurring. Research studies that use combined social-ecological approaches can be of great utility to managers of natural areas (D'Antonio, Monz, Newman, Lawson, & Taff, 2013). However, few studies of natural area management, especially in smaller and urban-proximate preserves, have used such interdisciplinary approaches that combine recreation ecology techniques with social science techniques.

Very few studies have used recreation ecology techniques in urban-proximate natural areas (e.g., Leung et al., 2013; Manning, Leung, & Budruk, 2005) and only a handful of published studies have used social science-based management techniques in urban-proximate natural areas. For example, Gobster, and Westphal (2004) examined information from several survey-based studies to examine how recreationists perceived and used a Chicago, Illinois greenway. Torbidoni (2011) interviewed visitors to examine recreation demands, perceptions, and behavior of hikers in protected areas near Catalonia, Spain. Andereck, and Knopf (2007) studied visitor experiences in an urban-proximate recreation area near Phoenix, Arizona using surveys to determine how factors in recreation experiences change the way visitors view and interact with the natural area. A few studies have also been completed in Austrian urban-proximate natural areas examining visitor perceptions and issues of crowding (Arnberger, 2012; Eder, & Arnberger, 2012). These past urban-proximate natural areas studies, tend to focus on only a single, social aspect of natural area management rather than using a more integrated, interdisciplinary approach (Budruk, & Manning, 2003; Mertz, 2002; Vaske, & Donnelly, 2007).

### 1.1. Recreation ecology: monitoring and assessments of trail conditions

Recreation use of natural areas can lead to negative natural resource change such as – but not limited to – soil erosion, trampled vegetation, the formation of informal trails, disturbance to wildlife, and the introduction of invasion species (Hammit, Cole, & Monz, 2015). The field of recreation ecology, which examines the ecological consequences of recreation and nature-based tourism use, has examined issues worldwide to better understand recreation disturbance to natural and/or protected areas (Monz, Cole, Leung, & Marion, 2010a). Due to monetary and staffing constraints at small, natural areas, recreation ecology studies have mostly occurred in large, high-use, federally protected natural areas such as national parks and national forests (e.g. Cole, Foti, & Brown, 2008; D'Antonio et al., 2013; Leung, Newburger, Jones, Kuhn, & Woiderski, 2011; Marion, & Farrell, 2002).

Establishing a baseline of resource conditions from which future change may be measured is essential to the effective management of natural areas; especially those receiving high recreation pressures from urban centers. Monitoring and assessment

studies (e.g., Marion, & Leung, 1999; Monz et al., 2010b) are one of the most common ways recreation ecology techniques are utilized in natural areas. These approaches evaluate the location and extent of recreation use and related recreation impact (such as vegetation damage and soil erosion) with a common goal of establishment of a level of baseline conditions from which future resource changes can be compared or management actions evaluated.

Trails are one of the main recreation features of management concern when it comes to monitoring and assessment studies. Trails provide a primary means of recreation access and thus the condition of trails is essential for providing quality recreation experiences. Trails concentrate recreational activities in areas that are hardened thus reducing impacts to other natural resources (Marion, & Leung, 2001). A main management challenge is to prevent the degradation of trail systems through impacts such as erosion and trail widening. Trail assessments can provide baseline information from which to monitor future changes in trail conditions, highlight areas that may need maintenance, and note areas where visitor disturbance may be occurring (Marion, & Leung, 2001).

A variety of monitoring and assessment methods have been developed for foot trails in parks and protected areas (see Cole, 1983; Leung, & Marion, 2000 for reviews). These methods may be classified into two main groups based on the assessment approaches (Leung, & Marion, 2000; Monz, 2000): *sampling-based* approaches and *census-based* approaches. *Sampling-based* approaches generally utilize systematic point sampling, where assessments are conducted at a fixed interval along a trail (Cole, 1983, 1991; Leung, & Marion, 1999a). *Census-based* approaches either evaluate the linear extent of specific trail conditions (Bratton, Hickler, & Graves, 1979), or assess every occurrence of pre-defined impact problems such as erosion or trail widening (Cole, 1983; Leung, & Marion, 1999b; Marion, 1994). In this study, trail assessments – using both sampling-based techniques and census-based techniques – analyzed the current ecological conditions of the Swaner Preserve trails. The trail assessments examined various indicators of trail quality including trail tread and trail soil and vegetation conditions, and assessed maintenance features; combined these measures are indicators of the level of recreation impacts on the Swaner Preserve.

### 1.2. Social science: estimating recreation use levels

The level of recreation impact and disturbance that occurs in a natural area is dependent on a variety of factors including levels of recreation use (Hammit et al., 2015). The estimation of recreation use numbers is essential not only for monitoring and understanding the ecological components of recreation but for economic considerations as well. Estimating recreation use levels through visitor counts can help researchers and managers understand visitor impacts to the environment, be used in assessing current and future facility development, and be an indicator of the value of recreation to visitors (Loomis, 2000). Data from visitor use monitoring efforts can provide support for natural area management decisions related to recreation and development (Loomis, 2000).

Various methods have been developed to estimate visitor use levels in natural areas. Self-counting methods include voluntary registration by visitors and voluntary or mandatory permits. These self-counting methods are most often employed in backcountry or wilderness areas. In small, urban-proximate natural areas, indirect counting methods can be used effectively and easily (Hollenhorst, Whisman, & Ewert, 1992; Watson, Cole, Turner, & Reynolds, 2000). Indirect counting methods often employ the use of automatic counters that can be installed at important recreation locations such as trailheads and trail junctions. The data from these

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