New Tools and Techniques for Outdoor Recreation Planning and Management

BY LEE K. CERVENY AND ERIC M. WHITE

Outdoor recreation planners and managers face unique challenges to predict, prepare, and plan for recreation use while accounting for a changing set of potential recreation users and a dynamic forest landscape. The Pacific Northwest is experiencing changing demographics and an influx of new residents, suggesting a potential shift toward different modes and patterns of recreation. Further, in rural places, some communities have experienced population growth and development, while others face declining economic opportunities and an aging population. Landscape-scale environmental changes, such as climate change, increased wildfire severity, invasive species spread, and other large-scale changes affect recreation settings and human behavior.

Planning and managing for outdoor recreation on public lands requires real-time understanding of these changes to our population and our region. It also requires a landscape-scale approach to understand recreation as a component of a broader socio-ecological system that crosses multiple jurisdictions that includes public and private lands. New technologies and broad-scale planning approaches hold promise to improve our ability to measure and monitor who is visiting our public lands, what experiences and settings these visitors seek, what sites and routes they tread upon, and the implications of public visitation on wildlife, vegetation, and soils.

Here, we reflect on a select group of approaches that have been piloted and applied in the Pacific Northwest region. With technological advancements in digital media and data science, we expect to take more steps forward down the trail of understanding.

Measuring Recreation on Forest Service Land Using Social Media Data

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Recreation is the central way people engage with national forests. However, one of the most challenging problems facing managers is understanding the amount and character of recreation use on public lands. On-site visitor monitoring efforts, such as the Forest Service National Visitor Use Monitoring Program, provide important information about recreation use on public lands. However, the expanse of public lands and the cost of implementing such programs limits the spatial and temporal coverage of recreation use estimates.

This research investigates the potential to use counts of social media posts at recreation destinations to estimate recreation use on public lands. Our focus is on geo-located and dated posts to publicly available social media platforms such as Flickr, Instagram, and Washington Trails Association trip reports. In this research we have found strong correspondence between counts of recreation use from social media data and traditional on-site counting methods, such as infrared trail counters, for a wide range of individual trails on the Mt. Baker-Snoqualmie National Forest. At broader scales, we have also found that the number of Flickr posts from individual national forests across the US corresponds to the official estimates of recreation visits for those national forests. Building on the initial project success, we are currently replicating our study in a more rural landscape in northern New Mexico that contains a mix of different federal public lands and a wider range of recreation opportunities.

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Understanding Recreation Connections with Human Ecology Mapping

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New approaches are being developed to help public land managers understand the spatial distribution of recreation uses and values across a landscape to inform natural resource planning. Human Ecology Mapping (HEM) uses maps and other spatial tools to identify special places, capture prime locations of recreation use, and pinpoint areas that provide unique ecosystem values and benefits to people. It also is used to identify areas where community residents, forest visitors, and stakeholders observe changing environmental or social conditions, such as crowding or user conflicts.

Using the HEM protocol, stakeholders identify forest destinations, roads, and access points of importance by drawing on or marking paper or web-based maps. For each site, we capture primary activities, as well as the frequency, duration, and seasonality of use. These maps are digitized and combined with hundreds of others to understand broad patterns of use across a large landscape, such as a forest, monument, refuge, or park. HEM can be done with a web-based platform, a mail survey, public workshop, or a community event. The use of HEM creates socio-spatial data layers that can be analyzed using GIS and integrated with biophysical data such as elevation, canopy cover, salmon or endangered species habitat, wildlife characteristics, roads, and recreation infrastructure. The HEM protocol can be adapted for use at the bio-regional scale (all-lands), at the forest or park scale, at the watershed scale, or for a particular resource area (e.g., restoration area, designated use area, Wilderness area). HEM was recently conducted on the Deschutes and Ochoco national forests and Crooked River National Grassland to identify important forest destinations to inform future forest planning. HEM also was used to gather public use information about priority forest roads for travel management planning on the Mt. Baker-Snoqualmie National Forest.

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Landscape Conservation Planning that Includes Human Uses

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An important challenge for recreation management is including humans in large-scale landscape conservation plans. A four-step, issue-based process was developed to implement the Sustainable Human Use Framework for Prince William Sound in Alaska.

Step 1: Identify keystone recreation experiences. A keystone experience was defined as a "specific and popular visitor activity that is unique to the area, and a primary visitor attraction, rather than something people do as they travel to some other destination."

Step 2: Issue identification. Managers and stakeholders identify specific sustainable use issues (e.g., reducing human impacts at culturally sensitive sites, or the need to develop a comprehensive outfitter and guide allocation strategy).

Step 3: Issue analysis. This is the heart of the process. For each issue identified in Step 2, an independent analysis was conducted to: a) frame the issue using relevant social, ecological, and economic data; b) identify sustainability objectives; c) identify specific policy and management strategies to address the issue while protecting keystone experiences; and d) identify specific and practical monitoring strategies.

Step 4: Plan recommendations. Recommendations are developed by synthesizing the issue-specific actions and strategies into broader recommendations that address the issues and advance regional human sustainability goals. The issue-based process provides an analytic focus on recreation and other human uses in landscape-level conservation plans, and identifies key data and stakeholder engagement needs. The primary goal of the approach is to sustain opportunities for keystone activities at the same time as protecting environmental and cultural resources.

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Measuring Human Wildlife Interactions with Camera Traps

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Public lands protect habitat for wildlife and provide recreational opportunities to the public. Understanding how wildlife responds to recreation, through the presence of recreationists and recreational infrastructure, is critical toward informing recreation and wildlife management. Camera traps (i.e., motion-triggered infrared cameras) are widely used by wildlife biologists to understand animal behavior and distribution. Camera-based methods have also been used to measure the volume and type of recreation at the site level. However, methods for observing animals and people using cameras are typically very different, with cameras being placed low for animals and high for people.

We developed and optimized a method to capture both wildlife and recreationists along trails using camera traps. This involves attaching a camera to a tree 1-2m from the edge of a trail, at knee height, and with a shallow angle (not quite parallel) to the trail. Cameras are best placed where movement is expected to be slow, such as at the peak of a hill or where the terrain is difficult.

This method provided accurate counts of hikers, runners, and mountain bikers, and corresponds with guidelines for wildlife-oriented camera trap placement. Camera traps can be used along existing trails to determine the amount and type of both recreational and wildlife activity occurring along trails. It has been implemented to study the effect of trail building on wildlife through a before-during-after control-impact study and is currently being used to understand how mule deer respond to recreation. Additionally, this camera-based method provides a way to build recreation monitoring into new and existing wildlife monitoring programs, providing guidelines to effectively collect data on two aspects of public land management simultaneously.

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