

Next-generation Visitation Models using Social Media to Estimate Recreation on Public Lands

A newly completed interagency study examines the promise and potential pitfalls of using social media to estimate recreational visitation to public lands, forests and parks.

The Challenge of Recreation Monitoring and Promise of Social Media Data

Federal lands receive over 800 million recreation visits each year. Providing recreation opportunities that meet the desires of an increasingly diverse visitor population while also conserving the natural environment requires timely and reliable information on recreation visits as well as visitor characteristics and preferences.

Traditional approaches to recreation monitoring, such as traffic counters and visitor surveys, have proven useful for gathering consistent, long-term, data on recreation on public lands. However, traditional approaches can be time-consuming, relatively costly, and challenging to use.

There are over three billion social media users worldwide who share billions of pieces of content each day. Social media users who visit Federal lands often share digital information about their experience in the form of photos, posts, or trip logs, some of which are geographically specific.

*Read the full study:
Next-generation Visitation Models using Social Media to Estimate Recreation on Public Lands*

Researchers have developed techniques for analyzing this publicly available information to characterize outdoor recreation use.

A growing body of peer-reviewed research shows a relationship between estimates of use generated from social media data and the best estimates of visitation generated from traditional methods.



Courtesy NPS / Jacob Frank

Working Together to Test New Tools

Federal recreation providers are collaborating with partners in academia, recreation organizations, and industry to study crowd-sourced data and better understand its advantages, limitations and potential applications.

A newly completed study - **Next-generation Visitation Models using Social Media to Estimate Recreation on Public Lands** - examines the promise and potential pitfalls of using social media to estimate recreational visitation to sites on public lands. Using a novel dataset of over 30,000 social media posts and 286,383 observed visits, from two regions in the United States, it compares multiple competing statistical models for estimating visitation based on social media and other variables such as time of year and weather.

The study focuses on recreation areas located in two considerably different regions: rural Northern New Mexico and the Mt. Baker-Snoqualmie National Forest adjacent to Seattle in Western Washington. These areas were selected because of their differences in geography, ecology, managing agency and proximity to urban areas.

On-site counts and social media data were collected for 13 sites in recreation areas managed by the Bureau of Land Management, US Forest Service and National Park Service in Northern New Mexico. A similar approach was taken at 26 sites in recreation areas managed by the US Forest Service.

Key Findings

Contrary to expectations, the study found the rate of posting to social media about recreation visits was similar between the two regions. Both regions displayed positive correlations between three social media data sources and observed visitation. Despite consistent relationships at the regional scale, there was a large site-to-site variability in how visitors use social media within both regions.

The study found it was possible to estimate absolute numbers of visits with a model that relied solely on social media data and general information such as weather and day of the week. However, the accuracy of model predictions were improved when some on-site counts were also included. Ultimately, social media data can be used to estimate visits to places where little to no on-site data is available, but appears most effective when combined with some traditional recreation monitoring data.

Study Location

Northern New Mexico

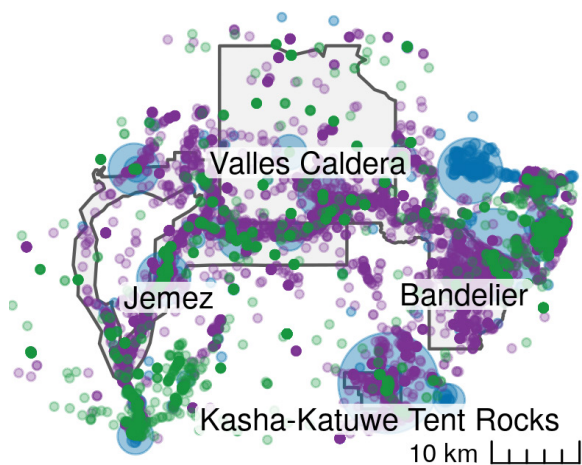


Kasha-Katuwe Tent Rocks National Monument. Courtesy BLM.

Western Washington



Middle Fork Snoqualmie River. Courtesy USFS.

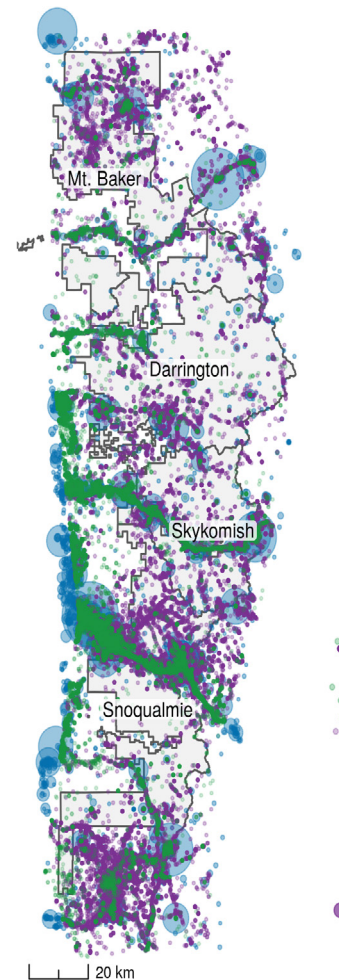


Social Media

- Flickr
- Twitter
- Instagram

Locations of geotagged social media posts made by visitors to public lands in WWA and NNM.

Points represent the latitude and longitude where a Flickr photograph (purple) or tweet (green) was created. For Instagram, points represent places to which images were assigned by users (blue).



Relative advantages of using social media and crowd-sourced data compared to traditional methods

Scale and spatial coverage

- Billions of social media users and their posts are available across the globe.
- The information is widely available and independent of land ownership or political boundaries.

Temporal coverage

- Year-round coverage compared to the short or intermittent periods of traditional data collection.
- A “time machine” for looking back in time for additional information about visitors in places or times where on-site data was not collected.

Different operational costs from traditional methods

- Traditional methods require staff and equipment for collecting data on-site.
- Social media approaches require locating and securing access to digital data.
- Both approaches require preparing, analyzing, and reporting on the information.

Complementary to traditional methods

- Can be used in settings where traditional methods are limited, such as dispersed recreation, sites with numerous access points, where visitors and non-visitors are intermingled.



Limitations and considerations

Social media techniques cannot replace traditional methods

- Some on-site data are still required in many cases in order to calibrate signals on social media.

Potential for biased information

- Social media users are a self-selected population.
- Different groups of individuals are attracted to different social media platforms.

Some settings are also challenging for social media techniques

- Small recreation sites.
- Low-visitation areas, where social media use is thus also low.

Data access and availability

- Cost of data access can vary widely by source.
- Future costs and protocols for accessing data are uncertain.
- Future popularity of various social media platforms is uncertain.
- Privacy concerns require special attention for collecting, storing, and using data.

Promising Applications for Social Media Techniques

Understanding the Quantity of Visitation

- Comparing relative visitation levels among several areas.
- Revealing seasonal patterns over time.
- Identifying popular areas within a park or recreation area, beyond park- or forest-level estimates.
- Forecasting short-term visitation levels based on social-media popularity.

Insights into visitor characteristics (potentially using content analysis)

- Visitors' home locations and demographics.
- Popular recreation activities on-site.
- Complementary sites and off-site activities.

Creating a Two-Way Dialogue with Visitors

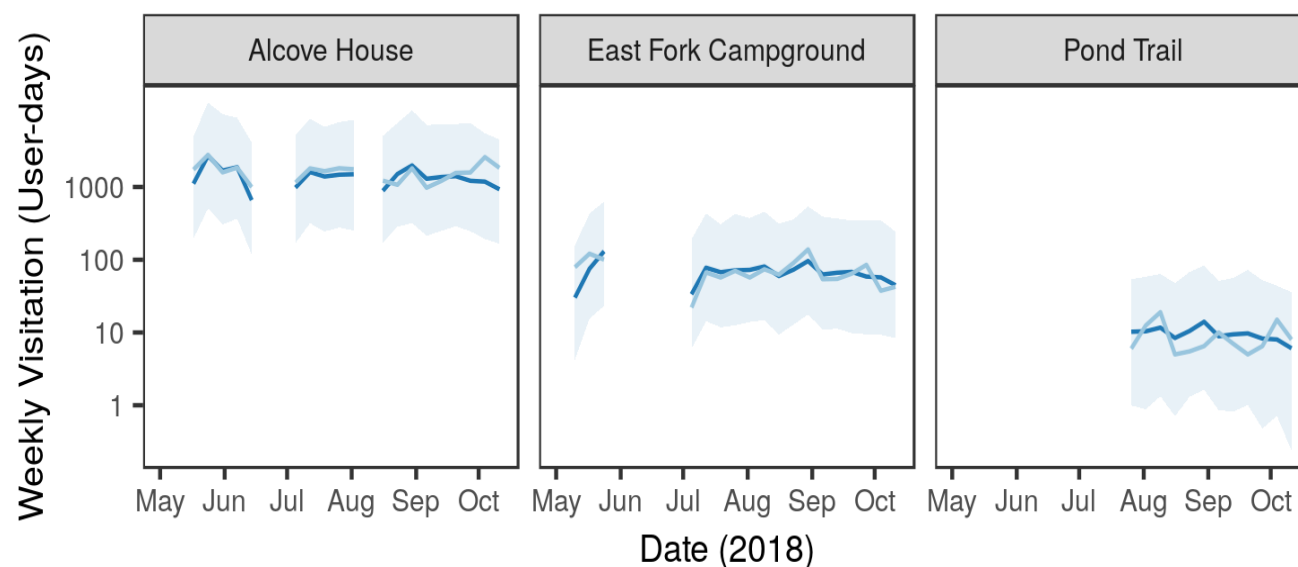
- Creating pathways for citizen science.
- Offering digital surveys via 'digital rangers'.
- Location-based survey questions, such as for crowding at high visitation parks.

Understanding the impacts of real-time events

- Modeling visitation and observing responses to disturbance such as wildfires and floods.

Improving the efficiency of traditional methods

- Better targeting the timeframe or location of a visitor survey or count.
- Providing independent verification or calibration for traditional counts.



Comparison between estimates of visitation using social media data and other factors (dark blue) and actual observed use (light blue) on recreational trails in New Mexico.

For more information



Spencer Wood spwood@uw.edu
Sama Winder sgwinder@uw.edu
Emmi Lia emmilia@uw.edu
University of Washington



Christian Crowley christian_crowley@ios.doi.gov
Department of the Interior Office of Policy Analysis



Eric White ericwhite@fs.fed.us
US Forest Service Pacific Northwest
Research Station



Adam Milnor adam_milnor@nps.gov
National Park Service Rivers, Trails and
Conservation Assistance