

## 96 Potential contributions of crowd-sourced data in public lands recreation monitoring systems

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Data on recreation use and visitor patterns are critical for information decisions about recreation management and policy. In the U.S., the recreation monitoring systems used by the federal public land agencies rely almost exclusively on traditional tools and approaches (Leggett et al. 2017). Specifically, U.S. federal agencies commonly combine permanent and temporary traffic counters with on-site visitor surveying to measure the amount of recreation use and visitor characteristics. Of the federal agency recreation monitoring programs, the National Visitor Use Monitoring (NVUM) Program used by the United States Forest Service is viewed as the most comprehensive. Recreation practitioners and policymakers have raised the potential for using crowd-sourced and online information posted by visitors in place of, or as supplement to, traditional recreation monitoring programs. We have found that crowd-sourced data, including social media posts, are well correlated with official NVUM use estimates across a range of spatial resolutions (Fisher et al. 2018, Wood et al. 2020). Further, Wood et al. found that models could be used to directly estimate the amount of recreation use, even at previously unstudied sites. However, that study also found that models developed using social media data worked best when they incorporated some on-the-ground counts gathered using traditional approaches. In this

presentation, we describe opportunities to use crowd sourced data to complement the National Visitor Use Monitoring Program. First, crowd-sourced data offers the ability to infer patterns in recreation use at individual sites. The NVUM sampling program is not designed to provide recreation use estimates for individual sites and crowd sourced data offers promise to fill in this gap. Second, the NVUM program only provides results for individual forests every five years. By identifying relationships between the crowd-sourced data and the NVUM data collected in the on-the-ground sample year, we can develop an estimate of recreation use trends in the years between NVUM sample estimates using crowd-sourced data. Finally, the NVUM sample is drawn from a population of recreation site days characterized by field managers. This characterization can be difficult for managers because it requires knowledge of fine-scale temporal patterns in recreation use at individual sites. We believe that crowd-sourced data can be used to assist in describing those temporal trends, potentially improving the accuracy in characterizing the site day population.

### References

Leggett et al. 2017: [https://www.doi.gov/sites/doi.gov/files/uploads/final.task1\\_report.2017.04.25.pdf](https://www.doi.gov/sites/doi.gov/files/uploads/final.task1_report.2017.04.25.pdf). Fisher et al. 2018: <https://www.fs.usda.gov/treesearch/pubs/56407>. Wood et al. 2020: <https://doi.org/10.1038/s41598-020-70829-x>.