Testing the use of wild game cameras for US Forest Service recreational visitor monitoring in Oregon/ Washington, USA

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In 2015 a university research groupbegan developing new methods for data collection using wildlife cameras (game cameras) for short-term (7-day) and long-term (year-round) data collection at pre-selected recreation sites. The pilot study is in support of the US Forest Service (Region 6) National Visitor Use Monitoring Program (NVUM) program. NVUM has been the sole method of understanding visitor use within the US Forest Service since 2000. The USFS NVUM program manager selected 13 sites across Region 6 for the pilot study. Game camera methodology includes 16 short-term data collection sites scheduled for data collection at various times throughout the FY 2016 (four sites per Forest). These are a selection of low use sites and the goal is to continue to collect better quality data, reduce potential safety concerns, and at a reduced financial cost. Long-term data collection involves deploying cameras for year-round data collection.These is a selection of Permanent Traffic Counter sites where other monitoring methods pneumatic and infrared counters) are not appropriate for long-term monitoring due to factors such as geography (e.g. destruction by snow-plows) and limitations of the units (e.g. failure of some infrared counters to register high use counts).For both short-term and long-term sites, cameras can be used to collect valuable data pertaining to trail use (group size, overnight or day use, length of stay, etc.) and vehicle use (vehicles counts entering/exiting the Forest, vehicle type, etc.). Accordingly, we sought to a) Determine appropriate interval settings for cameras based on site type (i.e. necessary frequency of the recording of images to capture use of trails, roads) and b) Gather more information to contribute to the protocol in development for short-term (7-day) and long-term sites.

Methods

Multnomah Falls, CRGNSA
Three cameras were deployed simultaneously and collected data for a period of two hours on 3/16/2016. Cameras captured images at the following intervals:

- 3 seconds
- 5 seconds
- 10 seconds

Cameras were deployed on the trail at the halfway point between the Multnomah Falls parking area and Benson Bridge. This location was ideal for testing because it is high use (yielding a large sample in a short timeframe), is known for various user types (casual day users, hikers, and runners), and is representative of a "typical" trail switchback comparable to areas where many cameras will likely be placed according to planned sites.

Salmon River Road, Mt. Hood NF
Three cameras were deployed simultaneously in one location to calibrate best interval times for game cameras. The game cameras captured images at the following intervals:

- 1 second
- 3 seconds
- 5 seconds

Cameras were deployed facing NW in the Mt. Hood National Forest, approximately 500 feet from the Forest boundary on Salmon River Road. This location was ideal for testing because it was considered to be comparable to many forest recreation sites where cameras may be deployed to assess vehicle use (45 mph) and included "typical" roadside vegetation (tall trees more than 5 meters from the road) where many cameras will likely be placed according to planned sites.Placement of the 5 second interval camera at Salmon River Road resulted in a frame which captured less of the road than the other cameras. It was expected that all three cameras would have captured the same number of vehicles had they been placed in the exact same location.

Results/Discussion

Each time-lapse video was reviewed and a hand tally counter was used to record the numbers of visitors or vehicles entering or leaving the area. Results from each video are below:

Multnomah Falls, CRGNSA (3/16/2016 09:22-10:00)

	3 second interval	5 second interval	10 second interval
# of visitors visible (entering)	52	52	52
# of visitors visible (exiting)	26	26	26

Salmon River Road, Mt. Hood NF (3/17/2016 09:24-10:22)

	1 second interval	3 second interval	5 second interval
# of vehicles visible (entering)	9	9	6
# of vehicles visible (exiting)	7	7	5

There is no "one size fits all" camera deployment method for any site type. Each site will require careful planning. The time and effort necessary for camera deployment is not at all comparable to pneumatic/infrareddeployment. Selecting proper locations for deployment at the two sites and placing the cameras for these tests took well over one hour. This process will be more time-consuming when locations are selected for actual 7-day and permanent traffic counters sites, because cameras should be placed in more discreet locations than were necessary for these tests, and they should be well-camouflaged.

Based on results, it is likely that trail use (foot traffic) can be captured with a 10 second interval setting with careful placement. The next longer interval setting available on the unit is 20 seconds. This is likely too infrequent to capture all use. For some areas, it may be decided that longer interval settings are appropriate. For example, trails which include points of interest (where visitors linger) or where multiple switchbacks can be captured within the camera frame would allow for longer interval settings.

The results showed that the use of roads (vehicle use) can usually be captured with a 5 second interval setting with careful placement. Results of the Salmon River Road test showed that some cars were missed with this setting. It is likely that more careful thought about placement would have captured all use.

Salmon River Road is a 45 mph road that is comparable to other settings. A vehicle moving 45 mph moves 66 feet per second. Therefore, a camera set to record an image every 10 seconds would need approximately 660 feet (two football fields) of straight road to do so without missing data. This does not allow for speeding vehicles. More reliable data should result with a shorter interval setting plus placement that uses curves, points of interest, or other places where vehicles are likely to slow down.

Conclusive findings and management implication will be discussed and related to local settings. Some discussion concerning the generalizability will also take place.