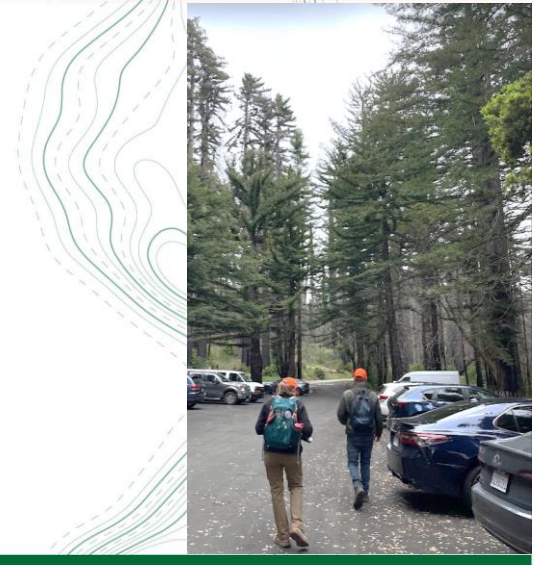




Oregon State
University



Visitor Use Monitoring Protocol

Parking Lot Count Protocol to Monitor Parking Lot Utilization

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Overview

This protocol is used to monitor the utilization of parking lots. Parking lot counts are a standard metric used as a proxy for visitor use levels. Monitoring the number of vehicles in a parking lot, designated roadside parking area, or undesignated parking can provide a sense of general use levels at that location. Parking lot counts can also help to inform where visitors are accessing backcountry locations. When collected in the same parking areas across many hours and days in a use season, parking lot counts can be analyzed to provide estimates of the average number of vehicles per hour or day in a predefined parking area. Parking lot counts can also help managers understand when (during the day or across a use season) parking lots are full, where and when parking demands exceed the number of parking spots provided, and where roadside vegetation might be at risk from roadside or undesignated parking.

Considerations

When adapting this protocol to your own park, there are several factors to consider.

- 1) **Which parking lots will you monitor?** Monitoring can be fairly resource intensive, so we recommend prioritizing parking lots where results will be relevant to management decisions. For example, a lot with a new parking reservation system would be a high priority. If the parking lots you choose to monitor cannot be surveyed on the same day (e.g., they are located in separate areas of the park), you may need to monitor on separate days.
- 2) **Do you want to monitor turnover year-round or during a specific time of year?** You might choose to sample only dates during your park's peak visitation season, or you may be interested in differences in turnover rate throughout the year. This consideration may also be impacted by staff availability. An important consideration when making this decision is that you want to ensure that the data you collect are representative of the time period of interest. For example, if you are collecting turnover data to set reservation limits during the high use season, we do not recommend collecting data outside of the high use season.

- 3) **What period of the day will you survey?** This will depend on why you are gathering data. In many cases, it may be most useful to survey during peak visitation. Another example would be to select the sampling time based on your reservation system.
- 4) **What sample size do you need?** See the Protocol Catalog Introduction for detailed considerations for determining sampling size.
- 5) **Do you want to stratify your data by any variable?** If you expect that parking lot utilization differs based on day of the week, for example, you may wish to stratify your sampling dates into weekends and weekdays. This will ensure that you are able to compare results by the strata of interest.
- 6) **You may wish to include a way to designate vehicles that are parked on the roadside or in undesignated parking spots.** These variables and locations should be clearly defined in the protocol and added to the datasheet.
- 7) **Consider scenarios that may arise during data collection and plan for them.** For example, will vehicles using ADA spots be combined into the lot total, or is it important to count these vehicles separately? Additionally, do visitors ever move parking spots or leave and come back? If so, is there a procedure you want to use to capture these events?

It is important to note that some of the decisions listed above will be heavily impacted by staff availability. Our [Protocol Catalog Introduction](#) gives a more detailed overview of sampling strategies and considerations when making these decisions.

Protocol

- 1) Arrive at the predefined starting location for chalking data collection (see map below).
- 2) Check with park staff to identify their vehicles. If possible, you do not want to include your own vehicles or the vehicles of park staff in your estimates of turnover rates. Exclude these vehicles from chalking when you can do so consistently.

You may wish to add a note detailing which employees may be using the parking lot, as well as any volunteers (e.g., kiosk staff, docents, California Conservation Corps). You might also identify any additional areas where personal vehicles of contractors or volunteers are typically parked, as this may be useful for contextualizing your results.

- 3) Record the following information on a Parking Lot Count Data Sheet (see below). If multiple data sheets are required for an observation session, complete this information on every sheet. In the list below, the fields are bolded, followed by definitions of the type of information to record.

You might decide you want to collect additional data or to define these variables differently. The current definitions match the example datasheet.

- **Name:** Your first and last name.
 - **Date:** The date of your observation, MM/DD/YYYY
 - **Sky Cover:** Check one, “Sunny,” “P Cloud” (partly cloudy), or “Overcast” depending on the predominant conditions during the data collection session.
 - **Precipitation:** Check one, “present” or “absent” depending on the predominant precipitation conditions during the data collection. *Note: If mist is common at your study site, you may want to add a third option.*
 - **Temperature:** Check on (check boxes are provided in 10-degree Fahrenheit increments from 40 degrees to 90+ degrees) that represents your best estimate of the predominant temperature during the data collection event. *Note: In areas with no service, it may be helpful to carry a pocket or keychain thermometer if more precise estimates are needed.*
- 4) Record the start time for the chalking count, the number of vehicles with each number of chalk marks, and the end time for the survey in the appropriate fields. As you walk the parking lot, **add one chalk mark to the right tire of each vehicle**. Alternate chalk colors between rounds to make counting easier and to help you identify any mistakes. All vehicles in the parking lot should be included **except for your own vehicles and vehicles used by park staff**. Vehicles do not need to be parked in a designated space to be chalked.
 - **Parking Lot:** Use one row per lot. Use consistent naming for each lot.
 - **PL Count Start Time:** The start time (HH:MM, 24-hour clock) of the count.
 - **# Veh:** The number of vehicles present in the parking lot.
 - **# Employee Veh:** The number of vehicles in the parking lot that belong to employees
 - **PL Count End Time:** The end time (HH:MM, 24-hour clock) of the parking lot count.

- 5) Use the **Comments** field to document any unusual conditions or events.

Materials

- A storage clipboard
- A pencil or pen
- A wristwatch
- A fully charged smartphone (if using electronic survey forms)
- Chalk (multiple colors)
- Laminated maps or images of the monitoring zone
- Safety vest
- Paper datasheets

Tips

- Prepare a script to explain the study to visitors who you encounter during data collection. Introduce yourself and explain why you are collecting this information.
- Electronic data collection forms, such as Survey123 forms, may help to reduce errors during data entry.

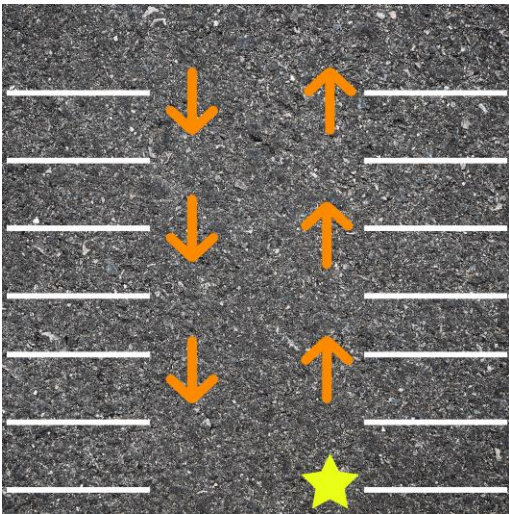
Data Analysis

Possible Statistics

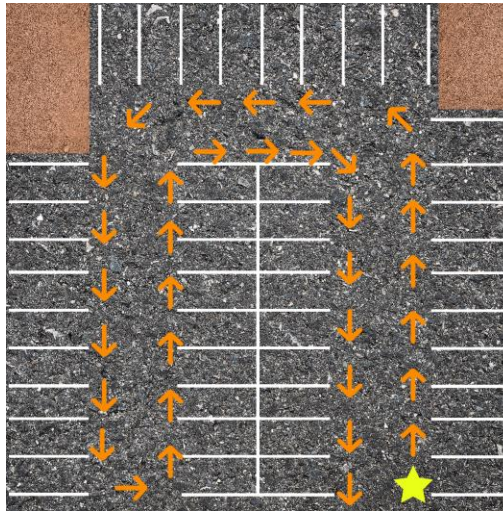
- Total cars in the lot at each interval.
- Percent of the lot being utilized at each interval.
- A comparison of the above statistics by another variable, such as weekday vs. weekend.
- Assess the relationship between parking lot counts and paid day use visitation (or another visitation measure).

Example Parking Lot Survey Maps

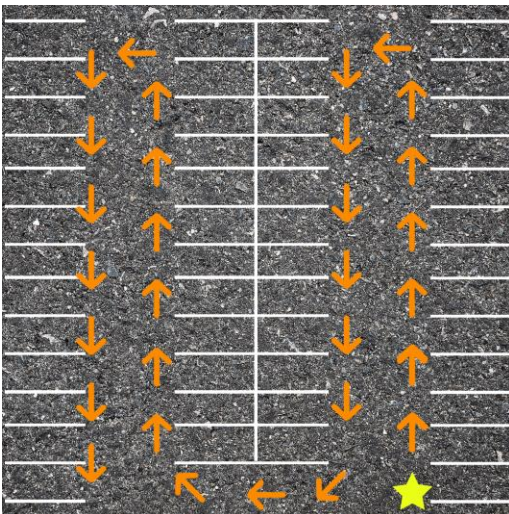
We recommend including maps of the parking lots that will be surveyed showing the survey route. Show starting location and direction. Only count one row of vehicles at a time. The following examples show how a route might be designed for various parking lot types.



Example: A square parking lot.



Example: A Closed "C" shaped parking lot.



Example: A "C" shaped parking lot.

Visitor Use Monitoring Protocol – Parking Lot Counts

Sheet _____ of _____

Parking Lot Count Data Sheet	
Name (First/Last):	Date (MM/DD/YY):
Sky Cover: <input type="checkbox"/> Sunny <input type="checkbox"/> P Cloudy <input type="checkbox"/> Overcast	Precipitation: <input type="checkbox"/> Present <input type="checkbox"/> Absent
Temperature: <input type="checkbox"/> 40-49 <input type="checkbox"/> 50-59 <input type="checkbox"/> 60-69 <input type="checkbox"/> 70-79 <input type="checkbox"/> 80-89 <input type="checkbox"/> 90+	

Parking Lot	PL Count Start Time	# Veh	# Employee Veh	PL Count End Time	Comments

RESOURCES

Survey123

- One option for an electronic data collection form, which can help to reduce errors in data collection.
- Available from Esri
- Tutorial: <https://learn.arcgis.com/en/projects/get-started-with-arcgis-survey123/>
 - This tutorial covers creating a survey, completing the survey, analyzing survey data, and sharing survey data with an interactive map.

SUGGESTED PROTOCOL CITATION

D'Antonio, A., Hall, T. E., Aberg, M., & Wanless, C. (2023). Parking Lot Count Protocol to Monitor Parking Lot Utilization. Protocol prepared for the Visitor Use Management Toolkit. Corvallis, OR: Oregon State University, Department of Forest Ecosystems & Society.