

# “Enhanced” Protocol for Monitoring Opportunities for Solitude in Wilderness

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## Introduction

One of the Elements of Wilderness Stewardship Performance (WSP) for the US Forest Service is “outstanding opportunities for solitude.” The protocol presented in this document can be used by wildernesses to obtain points beyond the 4-point level in Wilderness Stewardship Performance (see the Wilderness Stewardship Performance Guidebook for scoring rules).

This document provides procedures for sampling, data collection, and basic analysis.

## Background and Assumptions

This enhanced protocol ***assumes that initial monitoring has been conducted in monitoring areas as prescribed in the national minimum protocol*** (4-point level).

The national “minimum protocol” for monitoring opportunities for solitude in wilderness was designed as a low-level, minimal-effort approach that can provide insight about opportunities for solitude but that does not generate representative data that can be used to determine the overall encounter rates across a wilderness. It does not generate data that can be used to draw statistically valid inferences about encounters because it relies on a convenience (non-random) sample of observations. Having statistically valid data may be necessary to make defensible management decisions.

An ***important assumption of this enhanced protocol is that managers need to be able to draw conclusions about specific locations*** within a wilderness, rather than overall conclusions about the wilderness as a whole. (NVUM is an example of a program that permits general conclusions about types of areas, but does not sample in such a way as to allow conclusions about specific locations.) This assumption means that, in many wildernesses, substantially more data will need to be collected than was collected under the national minimum protocol. Data may be collected over multiple years; complete data could be collected in different monitoring areas each year, or data could be collected for each monitoring area over multiple years.

## Procedures

### Step 1: Identify monitoring areas<sup>1</sup>

Identify all the locations to be included in the inventory. (You should already have a map of travel zones or monitoring areas developed as part of the minimum protocol for your wilderness.) If a plan has standards for encounters, you should plan to monitor ***all areas where data or professional judgment establish that conditions are approaching or near the standards***. Regardless of whether standards are specified in a plan, ***at least 80% of total visitation in the wilderness should be encompassed by these areas***. In many wildernesses, there could be many areas that are not monitored because they receive little use. This could include off-trail areas, long trails to interior destinations, or other low-use areas. It is important to document the rationale for excluding areas from monitoring.

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<sup>1</sup> See Appendix A for definitions of key terms

Some things to consider when deciding whether to include an area for monitoring include the following:

- Is this area served by a single trailhead that routinely receives very little use or has a very small parking lot? If so, it may be appropriate to exclude it. Logical reasoning can be used to justify such decisions. For instance, if the standard for encounters is “no more than 10 groups encountered per day,” and the parking lot rarely has more than 5 vehicles present, it would not be possible that the encounter standard is violated on this trail, and there is no need to collect encounter data.
- Should off-trail areas be excluded? In many wildernesses, areas more than about ¼ mile from system trails receive very little use, especially where topography is inaccessible and there is dense vegetation. Therefore, most off-trail areas are likely to be excluded from monitoring. (However, known cross-country routes or popular off-trail destinations might need to be included.)
- Do you have data from ranger reports of visitor contacts that give you good reason to think an area receives little use? For instance, on “peak” weekends in past years, have rangers seen few people in this area? If so, you could articulate a plausible justification for excluding the area.

The areas to be included in this monitoring should be zoned into logical use areas, called “monitoring areas” (see Figure 1 for an example). Monitoring areas should be large enough to make sense for 4 hours of data collection (e.g., a 1-mile stretch of trail between two junctions is probably too small, while a 15-mile stretch of trail may be too long). It is also important that they match visitation patterns as closely as possible and begin and end where use levels change markedly. For example, for a 2-mile trail that passes a popular lake, it would probably make sense to include the access trail from the trailhead to the lake all as one “monitoring area,” while the trail that goes beyond the lake (and receives much less use) would be a different monitoring area. There may be exceptions that justify different decisions; for instance, if a popular waterfall is located at the end of a 1-mile trail, you may choose to consider this small area its own monitoring area. It is important to do what makes sense according to the way people use your wilderness, and then document those decisions.

It is necessary to collect the data in a way that one observation can be compared to another and that data for a given monitoring area at different times can be combined for analysis. Therefore, ***spatial boundaries for each monitoring area need to be clearly defined***. It is less important exactly where the boundaries are than to have them be consistently applied by each data collector. For example, in some wildernesses the decision might be made not to collect data on the first mile of a busy access trail, while in other wildernesses data might be collected starting at the trailhead.

In the example in Figure 1, the first monitoring area extends from the wilderness boundary to the west shore of Marion Lake. This 4-mile loop is a natural use area. The extension of the Marion Lake Trail to Minto Pass is a separate, lower-use monitoring area, and the trail from the west tip of Marion Lake to Marion Mountain is another monitoring area. All other trails shown in Figure 1 receive very little use and are not monitored for encounters.



Figure 1. Example Map of Monitoring Areas

Be sure to **review your forest or wilderness plan** to understand what, if any, **indicators and standards** have been developed. This may influence how you collect your data. For instance, if your forest plan has standards for the number of *groups* encountered, you will need to alter this protocol to count groups, rather than (or in addition to) individuals. The way standards are described in plans will also influence how you analyze your data. For example, many plans have standards for the percent of days that encounters can be above a specified number (e.g., “80% of the time a visitor will encounter 10 or fewer groups”). This requires defining what counts as a “day” (see below), as well as aggregating the observations obtained for each day. Other plans may have standards for the average number of encounters per day.

## Step 2: Sampling

You will need to draw a random sample of dates for collecting data in each monitoring area. This protocol stratifies sampling by weekday and weekend/holiday and requires a random sample of **5 weekdays and 5 weekend days/holidays for each monitoring area**.

As a hypothetical example, imagine a wilderness where 90% of all visitation takes place in July and August, and where there are four monitoring areas to be included in the inventory. This time period has 44 weekdays (denoted WD1 to WD44 in Table 1) and 18 weekend/holidays<sup>2</sup> (denoted WE1 to WE18). Using a random number table, on-line random number generator, or the “randbetween” function in Excel, we generate 5 unique numbers between 1 and 18 for weekends (WE5, WE10, WE11, WE14, and WE15). The corresponding dates are denoted in bold in Table 1. We do the same to generate 5 unique numbers between 1 and 44 to identify weekdays for sampling (WE6, WE7, WE15, WE25, and WE42). This process is then repeated for the other three monitoring areas. Note that random numbers are not necessarily evenly spaced and in fact may be clustered (e.g., July 10 and 11 were both randomly selected). Also, the same date may be randomly selected for multiple monitoring areas, which is fine.

To be able to use inferential statistics appropriately (i.e., to draw conclusions from the data to generalize about conditions within a location), it is important to use a random sample of dates. However, there may be times when it is not possible to collect data on a specific, randomly selected date (e.g., crew illness, fire closure). Or, the same date might be selected for multiple monitoring areas, and there are only enough staff to monitor some of those areas at one time. In such cases, it is permissible to substitute a different date. If timing conflicts are known in advance (for instance, if you are selecting monitoring dates at the beginning of the season to plan crew schedules), simply draw another random number to replace the selected date. If the conflict arises during the field season, it is permissible to substitute a date with another date from the same stratum that occurs within a week of the selected date. (For example, August 18 was identified for sampling in Table 1. If it were not possible to sample on that date, it could be replaced with August 11, August 19 or August 25). The important point is to do your best to avoid any systematic bias in selecting replacement dates. No more than half of the dates should be replaced in this way, and bad weather is not a legitimate reason to exclude a monitoring session. **Note that the more you deviate from randomly sampled days, the more you create opportunities for challenges about the representativeness of your data.**

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<sup>2</sup> In many wildernesses, weekends are Saturdays and Sundays. However, if there is good reason to include Fridays as “weekend” days, that is permissible, so long as the decision is well documented.

Table 1. Example of a Hypothetical Sampling Schedule for a Single Monitoring Area

| Sunday                   | Monday                   | Tuesday                  | Wednesday                | Thursday   | Friday     | Saturday                 |
|--------------------------|--------------------------|--------------------------|--------------------------|------------|------------|--------------------------|
| July                     |                          |                          |                          |            |            |                          |
| 1<br>WE1                 | 2<br>WD1                 | 3<br>WD2                 | 4 Holiday<br>WE2         | 5<br>WD3   | 6<br>WD4   | 7<br>WE3                 |
| 8<br>WE4                 | 9<br>WD5                 | <b>10</b><br><b>WD6</b>  | <b>11</b><br><b>WD7</b>  | 12<br>WD8  | 13<br>WD9  | <b>14</b><br><b>WE5</b>  |
| 15<br>WE6                | 16<br>WD10               | 17<br>WD11               | 18<br>WD12               | 19<br>WD13 | 20<br>WD14 | 21<br>WE7                |
| 22<br>WE8                | <b>23</b><br><b>WD15</b> | 24<br>WD16               | 25<br>WD17               | 26<br>WD18 | 27<br>WD19 | 28<br>WE9                |
| <b>29</b><br><b>WE10</b> | 30<br>WD20               | 31<br>WD21               |                          |            |            |                          |
| August                   |                          |                          |                          |            |            |                          |
|                          |                          |                          | 1<br>WD22                | 2<br>WD23  | 3<br>WD24  | <b>4</b><br><b>WE11</b>  |
| 5<br>WE12                | <b>6</b><br><b>WD25</b>  | 7<br>WD26                | 8<br>D27                 | 9<br>WD28  | 10<br>WD29 | 11<br>WE13               |
| <b>12</b><br><b>WE14</b> | 13<br>WD30               | 14<br>WD31               | 15<br>WD32               | 16<br>WD33 | 17<br>WD34 | <b>18</b><br><b>WE15</b> |
| 19<br>WE16               | 20<br>WD35               | 21<br>WD36               | 22<br>WD37               | 23<br>WD38 | 24<br>WD39 | 25<br>WE17               |
| 26<br>WE18               | 27<br>WD40               | <b>28</b><br><b>WD41</b> | <b>29</b><br><b>WD42</b> | 30<br>WD43 | 31<br>WD44 |                          |

### Step 3: Train staff

It is important that everyone who will be collecting data understands the details of the protocol. Some typical problems that have arisen in the past are these:

- Forgetting to record start and end times for monitoring sessions.
- Lack of consistency in decision rules about what counts as an encounter (e.g., handling multiple sightings of the same group; counting people seen in the distance vs. up close).
- Forgetting to complete camp encounter data.
- Inconsistency in recording the number of occupied sites visible from each occupied camp.

Once data collection begins, it is important to review each data collector's field data early in the season to identify and correct any problems.

### Step 4: Collect data

For each monitoring session (minimum of 4 hours of data on a given day – either in one block of time or in multiple blocks throughout a single day) you will need to record details about the monitoring session itself and data about two types of encounters:

- 1) **traveling encounters** are people you see and/or hear while traveling in the monitoring area<sup>3</sup>. You will need to establish guidelines about observer behavior – for instance whether the observer should stay only on established trails, whether observers should travel like “typical” visitors, or whether observers should sit at a destination and count people from a single vantage point. Again, there is no single correct approach for all wildernesses, and it is more important to justify, document, and apply consistently the approach you use.
- 2) **camp encounters** refer to the number of other camping groups visible or audible from each occupied campsite.

If more than one monitoring area is traversed in a day, tally encounters on a separate data form for each monitoring area. Be sure to note the times at which you start and stop data collection in each monitoring area.

Every encounter should be recorded during a monitoring session. Remember, too, that it is as important to document times when there are no encounters as times when other people are encountered.

### Filling out data forms

#### Traveling Encounters Instructions:

1. At the beginning of each monitoring session, **record initial information** at the top of the form (Figure 2), including:
  - The monitoring area name
  - The observer’s name
  - The date
  - The time when data collection started
  - Whether data are being collected on a weekday or weekend/holiday
2. Tally the **number of people encountered** within the monitoring area. Count all people seen or heard, no matter how close or far you are from them. If you hike past a camping group, include the number of people you see as traveling encounters (this includes administrative or outfitted camps – the idea is to document the impacts to visitors’ experiences).
  - a. If you can’t get an exact count of the number of people, make your best estimate.
  - b. If you see the same group more than once during a monitoring session, record the number of people as another (new) encounter if more than 15 minutes have passed since the first time you saw the group.
3. At the end of the monitoring session, fill out the **final information** on the form:
  - Record the time when data collection for this monitoring session stopped
  - Calculate the total amount of time during which data were collected

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<sup>3</sup> Most wildernesses will use “people seen or heard”; however, in some wildernesses it may be appropriate (and is acceptable) to supplement or replace this indicator with things such as the number of cruise ships heard, or number of vehicles seen from wilderness trails.

- Record the total number of people encountered

Figure 2. Data Collection Form for Traveling Encounters

| Traveling Encounters   |                             |
|--|-----------------------------|
| Observer: <i>Boutcher</i>  |                             |
| Monitoring Area Name: <i>Marion Zone 1</i>   | Start Time: <i>10:00 am</i> |
| Date: <i>July 14</i>   | Stop Time: <i>3:00 pm</i>   |
| <input type="checkbox"/> Weekday <input checked="" type="checkbox"/> Weekend <input type="checkbox"/> Holiday        | Total Time: <i>5 hrs</i>    |
| Tally number of people encountered here:<br>   ,   ,     ,    [note: this denotes 4 groups of 3, 2, 4, and 2 people] |                             |
| Total encounters: <i>11</i>  |                             |

Camp Encounters Instructions:

**Camp encounter data should be collected in the early morning or late afternoon/evening, because making observations during day-time hours provides a misleading picture of the actual experience of most campers.**

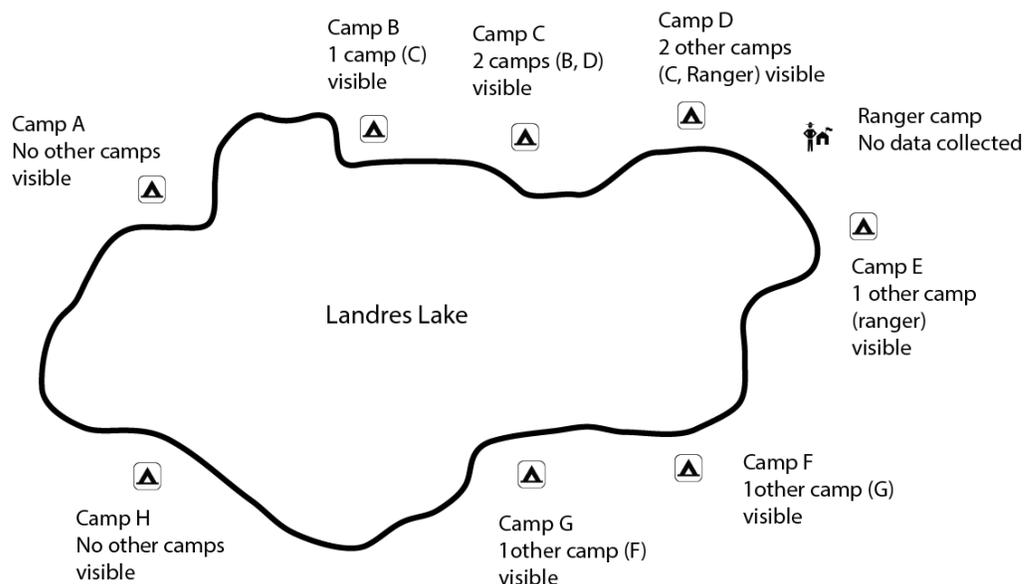
1. When monitoring camp encounters, every time you see a **campsite occupied by recreational visitors**, complete one line on the “Camp Encounters” form (Figure 3). From the vicinity of each occupied camp, count the number of other occupied camps within sight or continuous sound. (Continuous sound refers to sounds like conversation or routine camp activities that can be regularly heard from one campsite to the next.) Under “campsite” on the form, record the name or site number (if your wilderness has that information); otherwise simply number each observed camp consecutively for each monitoring day. See Figure 4 for an example: at Landres Lake, groups camped at sites B and C can see the group camped at Site D. The group camped at Site D can see the groups camped at Site B and Site C. The group camped at Site A can’t see any other campers.
2. If you are working in the same area for several days, complete the survey in the morning or late afternoon/evening each day. Thus, if a group camps for more than one day at the same site, there will be data recorded for that camp once per day.
3. It is essential that all occupied campsites be recorded – **regardless of whether or not there are other groups camping within sight or continuous sound** – so that data will be accurate. If no other occupied camps are within sight or continuous sound of an occupied site, enter a “0” in the “Number of occupied sites seen or heard” field. [Note: if the number of occupied sites within sight/sound changes over the course of the observation period, record the largest number observed at any given time.]

4. Do not record other camps within sight or sound of people camped at assigned/reserved outfitter camps, administrative sites and long-term Forest Service camps such as a trail construction camp, because the goal is to understand the visitors' experience (not the agency staff experience). However, when assessing the number of other camps within sight or sound of an occupied visitor camp, outfitter and USFS camps *should* be documented under the "number of occupied sites seen or heard" field. Also, if such camps are seen while traveling through a monitoring area, they should be included on the traveling encounters form (see Figure 4 for an example; groups camped at Sites D and E can see the Ranger's camp, so this is recorded as a camp encounter).

Figure 3. Data Collection Form for Camp Encounters

| Camp Encounters           |                |                                      |   |
|---------------------------|----------------|--------------------------------------|---|
| Observer: <i>Boutcher</i> |                | Monitoring Area: <i>Landres Lake</i> |   |
| Date                      | Time           | Campsite #                           | # occupied sites w/in sight or continuous sound |
| <i>July 14</i>            | <i>7:30 am</i> | <i>Landres Site A</i>                | <i>0</i>  |
| <i>July 14</i>            | <i>7:40 am</i> | <i>Landres Site B</i>                | <i>1</i>  |
| <i>July 14</i>            | <i>7:45 am</i> | <i>Landres Site C</i>                | <i>2</i>  |
| <i>July 14</i>            | <i>8:00 am</i> | <i>Landres Site D</i>                | <i>2</i>  |
| <i>July 14</i>            | <i>8:00 pm</i> | <i>Landres Site E</i>                | <i>1</i>  |
| <i>July 15</i>            | <i>7:30 am</i> | <i>Landres Site F</i>                | <i>1</i>  |
| <i>July 15</i>            | <i>7:40 am</i> | <i>Landres Site G</i>                | <i>1</i>  |
| <i>July 15</i>            | <i>7:45 am</i> | <i>Landres Site H</i>                | <i>0</i>  |

Figure 4. Example of Camp Encounters for Visitors Camped at Landres Lake





## Appendix A: FAQs:

### Protocol development:

- How was this “enhanced protocol” developed?
  - This protocol was identified as a national priority, and researchers at Oregon State University were asked to develop it. It used the national minimum protocol as a starting point.
  - Several wilderness managers volunteered to discuss their local challenges and needs, and these were considered in development of the protocol.
  - The national Wilderness Information Management Steering Team provided feedback on multiple drafts, and the final version was reviewed by the Regional Program Managers.
- How does this protocol differ from the national minimum protocol?
  - This protocol requires random sampling of monitoring dates (rather than allowing convenience sampling).
  - This protocol requires camp encounters to be monitored in the morning or late afternoon/evening, when camps are most likely to be present. (Experience with the minimum protocol revealed that few camps were observed during sessions when traveling encounters were monitored.)

### Definitions:

What is an “encounter”?

- In this protocol, a “**traveling encounter**” is defined as occurring when an observer sees at least one other person, regardless of the duration or proximity of the contact. Encounters are recorded as the number of people seen or heard. (Note: it may be desirable to include information on the number of groups as well as the number of individuals encountered. It is easy to adapt the data collection instructions to accommodate this – see Figure 2 for an example.)
- Special circumstances, such as seeing cruise ships or people who are outside of the wilderness, can be accommodated. You simply need to decide, and document, your decision rules.
- “traveling encounters” are people you see and/or hear while traveling on or off trail, but not from a camp. This includes, for instance:
  - Someone seen across a lake
  - A camping party you pass while hiking
  - People who hike past you on the trail
- “**Camp encounters**” are other groups camped within sight or sound of any campsite occupied *by visitors*. This determination should be made by visiting each occupied site.

What is an “occupied camp”?

- A campsite is considered occupied if there is evidence that recreational visitors are currently camping there, even if no people are present at the time the camp is observed.

What is a “monitoring area”?

- A monitoring area is a defined geographical location within which encounter data are collected. It can be a trail corridor, a destination, an off-trail area, or a combination of these. It should make sense from a managerial visitor use perspective and accommodate 4 hours of data collection per monitoring session.

What is a “monitoring session”?

- A monitoring session must include at least four hours of traveling encounter data collection on any given day, within a specified monitoring area. This can be either one continuous block of time, or total during a given day (for instance, if two hours are spent in the area in the morning, and two hours are spent in the area later in the day). It can be longer than 4 hours – for instance if an observer is present for 8 hours on one day, that still counts as a single monitoring day.
- For camp encounters, there is no set number of hours of monitoring on any given day. The key is to make sure that data are collected early in the day or in the late afternoon/evening, when camps are likely to be present. The specific times (e.g., before 8:00 a.m. or after 4:00 p.m.) must be established locally given knowledge of camping patterns.

What is a monitoring “day”?

- A day can be any length of time, though most monitoring programs consider a day to be 8 to 12 hours. Because it is recommended to convert encounter data into the number of encounters per hour for analysis, the length of the day does not matter; you can simply convert the number of encounters/hour to the appropriate day length for your area. (For example, if 4 people are observed in 4 hours, this is equivalent to 8 encounters in an 8-hour “day.”)

What is a “weekend”?

- Normally, weekends include Saturdays and Sundays. Holidays are also included in the stratum with weekends (and not as weekdays). However, in some locations, Fridays may be more like Saturdays and Sundays in terms of use; in such cases it is acceptable to include them in the weekend stratum. It is important to document such decisions and adopt them consistently.

### **Questions related to the general approach:**

Why not use trail counters or wilderness permits?

- Research has found that data on visitation from trail counters or wilderness permits often do not provide a good indication of the number of encounters visitors have with others, because people travel at different speeds, have different overall trip lengths, and go to different destinations. Even if there is a strong relationship between visitation and encounters, the specific relationship must be established for each travel area, which requires considerable staff time and statistical analysis. Therefore, this protocol requires data for actual encounters.

- However, it is ***strongly recommended that trail counters be used on trails where encounter data are collected***. If this is done, the relationship between use and encounters can be determined, and the trail counters could be used for continued, more comprehensive monitoring over time.
- Simple regression analyses in Excel allow you to determine the relationship between use and encounters.

Why does the protocol require sampling in so many areas?

- Wilderness managers need information about specific locations within wilderness. In many wildernesses (particularly small or low-use wildernesses), this enhanced protocol will not require substantially more data than the national minimum protocol. However, if 80% of the use in a wilderness occurs across many locations, all those locations need to be monitored.
- In WSP, a wilderness can earn 6 points for collecting data in at least half of all monitoring areas, and 8 points for completing the entire inventory.
- Many forests are working with plans that establish standards across a wilderness, not just for selected areas within a wilderness. Therefore, to be able to say whether conditions within a wilderness are in compliance with plan standards, all areas where there are potential questions about this must be monitored.

Why not collect data from low use areas?

- According to the definition used in this protocol, low use areas – in total – receive less than about 20% of the use to a wilderness. Therefore it is assumed that encounter rates in these areas will be extremely low. It is not efficient to monitor encounters in such areas, and therefore the protocol does not require it.
- However, managers may choose to monitor in low use areas if they have reasons to do so.

How can data from convenience sampling be used?

- Using data from convenience samples (i.e, dates that are not randomly selected) is tricky when making determinations about “typical” conditions in the wilderness. However, many wildernesses have collected data under the minimum protocol, and they may wish to use these data as part of the enhanced protocol.
- There is no straightforward answer to this question. The key is whether the convenience data are in any way biased. Were they collected on only high use weekends? Or were they collected by rangers only on low-use weekdays? Were they from early in the season during logging-out, or from only late in the season? If the answers to such questions is “yes,” then the data may not be suitable for combination with data from randomly selected dates. However, if the convenience data “approximate” a random sample, they may provide good insights into what is going on in a particular monitoring area. How can you know if they “approximate” a random sample? Ask yourself, how were the dates selected? Do you have any other data that can corroborate the representative nature of those dates (e.g., trailhead permit data)?

Can I collect other data besides the variables included on the minimum protocol data form?

- Yes. The protocol can easily be tailored to add additional information, such as length of stay (day or overnight), whether visitors have a wilderness permit, whether campers have fires, etc. Different forms would be needed, and many examples are available on wilderness.net.
- You may have additional local needs, for instance tracking overflights or encounters with cattle. If so, these data should be collected as well, though this is not required for credit in the WSP.

### **Questions related to specific data collection instructions:**

Why do you count people instead of groups?

- Counting people avoids the common problem in busy locations of not being able to determine which people are in which groups.
- However, if you have a reason to count groups, rather than people, that will qualify as conforming to this minimum protocol. Simply clarify data collection instructions.

Why count everyone seen, instead of only people passed on the trail?

- Counting everyone seen or heard avoids problems of having to decide whether to count someone as an encounter based on a subjective estimate of how far away they are. Additionally, in the wildest zones, seeing people in the distance may diminish the sense of solitude, even if they don't come very close to you.

Why count traveling encounters and occupied sites (camp encounters) separately?

- Research suggests that encounters at campsites can have a significant impact on visitors' experiences and sense of solitude, so it is important to record those encounters. On the other hand, because day visitors do not camp, the only encounters they have are traveling encounters, and it is important to be able to document the day use experience.
- Management actions to improve or maintain opportunities for solitude at camps and while traveling could be different.
- The maximum number of traveling encounters and camp encounters usually occur at different times of day. For instance, campers are most likely to see or hear other campers in the evening, but traveling encounters are most likely to occur midday.

Why do observers need to be present for 4 hours when collecting traveling encounter data?

- Analysis of comprehensive encounter data has shown that 3-4 hours is the minimum time block needed to gain a valid indication of the number of encounters a person would have over an 8-hour time period. Counting encounters for 4 hours is a strong indicator of (highly correlated with) the total number of encounters in a full day.

What if an observer encounters the same group more than one time?

- In this protocol, any group seen more than one time is considered an additional (new) encounter if more than 15 minutes have elapsed since the time the group was first seen. This is a judgment call, and amending the protocol to fit your unique situation is acceptable.

What if an observer loses track of encounters while talking with visitors or performing other duties?

- It is important to be as accurate as possible in documenting encounters. However, if you lose track of numbers, make a note of the gap in data and simply subtract that amount of time from the overall monitoring session.