



Impact Indicators and Methodology for Wilderness Campsite Inventory and Monitoring

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The following is a list of campsite impact indicators derived from wilderness monitoring programs on the Sierra, Inyo, Green Mountain, Wallowa-Whitman, San Juan, and the Dixie National Forests. The list covers many, but not all, indicators that are commonly used by wilderness managers to document and monitor visitor impacts.

The lists are organized into three study areas:

- general site information (see page 2)
- physical impacts (see page 7)
- social impacts (see page 19)

General Site Information:

The purpose of the general site information is to provide managers with a basic sketch of the site's location, monitoring documentation, and additional information not covered in the physical and social sections. This information aids managers in data management, site relocation, and documentation of new sites.

Indicator/Data Field	Elements	Attributes	Methodology
<i>Type of Site/Site use</i>		(Day-use, camping, stock tie area, stock camping, hunting camp, O&G camp)	Visual observation of site's use related impacts
<i>Date/time</i>			Record date and time the inventory was performed on Data sheet on in GPS. Note: Note: If using a data dictionary this can be automatically entered.
<i>Wilderness Area/Sub-Area</i>	Entire Wilderness		Reference map and record wilderness name or initials
	Management Units Within Wilderness		Reference Map and record management unit's identification name or number
<i>Site ID Number</i>	Photo ID Number	Based on the first photo number of the site's series of photos (ex. 100-1684)	Record site ID on data sheet or in the GPS
	Site Number/Date	Based on the date and a unique site number (ex. 145-6/25/05)	Record site ID on data sheet or in the GPS
	Site Number	Based on a unique site number (54)	Record site ID on data sheet or in the GPS
	Area/Site Number	Based on the management area/sub area and the unique site number (ex. Northfork-12 or NF12)	Record site ID on data sheet or in the GPS
<i>Photo ID</i>	Photo/Site #	Based on the photo number and series number (ex. 145-2)	Record Photo ID on data sheet or in the GPS
	Sequential Photo Number	Based on the number of the photo	Record Photo ID on data sheet or in the GPS
<i>Photo Point</i>	Hand Drawn Map		Sketch a map of the site

			that includes the photo points and any permanent features.
	Staking		Insert metal stake into the ground at the location photo was taken. (Usually combined with map)
	GPS		Record the location and photo ID number of photo on the GPS unit.
<i>Inventoried By</i>		Based on the person's name, initials, or first initial and last name who is inventorying the site	Record information on data sheet or in GPS
<i>Site Location</i>	GPS Location	UTM or Lat/Long	GPS the center point of the site. Information can later be used as a GIS layer.
	Map Location	(Section/Township/Range)	Reference quad map and record information on data sheet or in GPS
	Site Map (hand drawn)	Center point method with permanent features identified. (Permanent features include large rocks, trees/stumps, bodies of water, etc.)	Identify the center point of the site and measure the distance to the edge of the site at each azimuth (N, NE, S, etc.) or at an established incremental degree on the compass (10, 20, 30, etc.). Draw site map that includes measurements and permanent feature. May help to use graphing paper.
		Basic sketch with permanent features identified	Sketch a site map that includes permanent features.
	Site Map (GPS)		GPS the exact boundary of the site. May also want to GPS permanent and temporary structure (development) related to the site.

<i>Ecosystem Type</i>	General	Based on an observation of the ecosystem type (ex. Shrub Oak, Pinion/Juniper, Aspen, Spruce, etc.)	Record the dominant vegetation type on the data sheet or in the GPS file. Note: This information may already be available in a GIS layer.
	Overstory/Understory		Record the dominant species of the overstory and understory of that the site is located in on the data sheet on in the GPS.
<i>Ecosystem Structure</i>		(Streamside, slickrock, meadow, forested)	Record the appropriate ecosystem structure of the site in the data sheet or GPS.
<i>Ecosystem Feature</i>		(Valley bottom, basin, sideslope, mesa/plateau, ridgetop)	Record the appropriate ecosystem feature of the site in the data sheet or GPS.
<i>Slope</i>	Site Slope	(Actual slope) or (0, 1-2, 3-4, 5-6, 7-8, >8) or (<5%, 5-10%, >10%)	Use a clinometer to measure the site's slope and record it on the data sheet or in the GPS.
	Side Slope	(Actual slope) or (0, 1-3, 4-6, 7-9, 10-12, 13-15, 16-19, 20-30, 31-40, 41-50, etc.)	Use a clinometer to measure the sideslope the site is located on and record it on the data sheet or in the GPS. Note: This information may be already be available in GIS layer.
<i>Aspect</i>		(N, NE, E, SE, S, etc.)	Either use a compass to determine the aspect of the site and record it on the data sheet or GPS or use GIS to determine the site's aspect. Note: The site needs to be recorded with a GPS to use GIS to determine aspect.
<i>Elevation</i>		(Meters or feet above sea level) (Height above	Use a topographical map to estimate the

		ellipsoid)	elevation of the site or GPS the site and determine the elevation using GIS. Note: GPS unit can be set up to automatically record the elevation of the site.
<i>Expansion Potential</i>		(Poor, Moderate, Good)	Determine the potential for site expansion by considering condition surrounding the site (slope, rocks, vegetation density, drainage, etc.) and record the appropriate attribute choice on the data sheet or in the GPS.
<i>Closest Trail System</i>		Unique to each wilderness area.	Enter the trail name or route that accesses the site on the data sheet on in the GPS. Note: This information can be determined using GIS.
<i>Legal Status Of The Site</i>		(Legal, Illegal) This is typically determined by distance to water and other sensitive resources, or by the site's location within a closed area or management zone within the wilderness area.	Reference a map and determine if the site is legal or illegal and record the appropriate selection on the data sheet or in the GPS. Note: If the site's location is recorded with a GPS the site's legal status can be determined using GIS.
<i>Site's History</i>		(New, Existing/Reinventory)	Reference a map and determine if the site is new or existing and record the appropriate selection on the data sheet or in the GPS. Note: If the site's location is recorded with a GPS the site's

			historical status can be determined using GIS.
<i>Management Recommendation</i>			Enter any short-term/long-term management actions recommendation that may be necessary.
<i>Comment</i>			Enter any additional information about the site that is not covered by a required indicator.

Physical Impacts:

The purpose of the physical impacts information is to provide managers with data on the amount of physical impact of a site caused by the visitor use. This information can be summarized, weighted, and totaled to produce a quantitative value of the amount of impact related to the site's use. Physical impact indicators are the most commonly collected monitoring information in campsite monitoring programs. Careful thought should be given to accuracy and precision when selecting physical impact indicators and monitoring methods. In most cases accuracy and precision will need to be balanced with cost and availability of resources.

Indicator	Elements	Attributes	Methodology
<i>Vegetation</i>	Vegetation Cover On-site (Rapid Inventory)	(0-5%, 6-25%, 26-50%, 51-75%, 76-100%)	Estimate percent coverage by mentally "lumping" the vegetation on the site into one part of the site and record the appropriate attribute range on the data sheet or in the GPS.
	Vegetation cover Off-site (Rapid Inventory)	(0-5%, 6-25%, 26-50%, 51-75%, 76-100%)	Identify an area located near the site that has the same vegetation type, slope, aspect, etc. and estimate percent coverage by mentally "lumping" the vegetation on the site into one part of the site and then record the appropriate attribute range on the data sheet or in the GPS.
	Vegetation Cover On-site (Detailed Inventory)	(Areal extent) or (Percent cover)	Conduct a systematic plot survey and record the percent of vegetation cover or the total areal extent of the vegetation on the data sheet or on the GPS.

	Vegetation Cover Off-site (Detailed Inventory)	(Areal extent) or (Percent cover)	Identify an area located near the site that has the same vegetation type, slope, aspect, etc. and conduct a systematic plot survey and record the percent of vegetation cover or the total areal extent of the vegetation on the data sheet or in the GPS.
	Composition	(Percent forbs, graminoids, shrubs, seedlings/trees) or (species type and amount)	Conduct a systematic plot survey and record the percent distribution of vegetations types or the total areal extent of each vegetative type and/or record the species name and abundant on the data sheet or in the GPS.
<i>Noxious Weeds</i>	Presence	(Yes, No)	Determine if noxious weeds are present on the site and record the appropriate attribute selection on the data sheet or in the GPS. Note: In some monitoring program, protocols require the mapping of the areal extent of weeds either by hand or with a GPS. This information may already exist in a GIS layer, but should be monitored closely.
	Species and Amount	Unique to each wilderness area.	Determine if noxious weeds are present on the site. If present,

			identify them by species and record the name and areal extent on the data sheet or in the GPS. Note: In some monitoring program, protocols require the mapping of the areal extent of weeds either by hand or with a GPS. This information may already exist in a GIS layer, but should be monitored closely.
	Tree Reproduction	(Amount and species of seedling present on the site)	Conduct a systematic plot survey and record the number and species of tree seedlings on the data sheet or in the GPS.
<i>Tree Impacts or mutilations</i>	Percent Tree Damage (On-site)	(0-5%, 6-25%, 26-50%, 51-75%, 76-100%)	Determine the percentage of trees within the site's boundary that have visual damage that can attributed to human use and record the appropriate attribute choice on the data sheet or in the GPS.
	Percent Tree Damage (Site related)	(0-5%, 6-25%, 26-50%, 51-75%, 76-100%)	Determine the percentage of trees in and around the site that have visual damage that can attributed to human use of the site and record the appropriate attribute choice on the data sheet or in the GPS.
	Number of Damaged Trees	(No trees, No damage, broken	Determine the amount of trees

	(On-site)	branches/1-2 scarred tree, 3-7 scarred trees, >7 scarred trees/# of trees) or (Number of damaged trees)	within the site's boundary that have visual damage that can attributed to human use and record the appropriate attribute choice or number on the data sheet or in the GPS.
	Number of Damaged Trees (Site related)	(No trees, No damage, broken branches/1-2 scarred tree, 3-7 scarred trees, >7 scarred trees/# of trees) or (Number of damaged trees)	Determine the amount of trees in and around the site that have visual damage that can attributed to human use of the site and record the appropriate attribute choice or number on the data sheet or in the GPS.
	Number of Damaged Trees and Severity of Damage.	(Number of trees damaged in each classification: Slight, Bad, Felled)	Determine the amount of trees within the site's boundary that have visual damage that can attributed to human use and record the number of trees in each category of damage on the data sheet or in the GPS.
	Percent Canopy Cover (Rapid Inventory)	(0-25%, 26-50%, 51-75%, 76-100%)	Estimate percent cover by mentally "lumping" the canopy cover on the site into one part of the site and record the appropriate attribute range on the data sheet or in the GPS. Note: Remote sensing may be used

			in some cases to determine canopy cover of a site.
	Percent Canopy Cover (Detailed Inventory)	(0-25%, 26-50%, 51-75%, 76-100%) or (Actual Percent)	Conduct a systematic transect survey using "Cajanus Cylinder" (or similar device) and record the appropriate attribute choice or actual percent canopy cover on the data sheet or in the GPS.
	Root Exposure	(0-25%, 26-50%, 51-75%, 76-100%) or (number)	Determine the percentage or number of roots exposed and record the appropriate attribute choice on the data sheet or in the GPS.
<i>Soil Impacts</i>	Mineral Soil Exposure On-site (Rapid Inventory)	(0-5%, 6-25%, 26-50%, 51-75%, 76-100%)	Estimate percent of exposure by mentally "lumping" the exposed mineral soil on the site into one part of the site and record the appropriate attribute range on the data sheet or in the GPS.
	Mineral Soil Exposure Off-site (Rapid Inventory)	(0-5%, 6-25%, 26-50%, 51-75%, 76-100%)	Identify an area located near the site that has the same vegetation type, slope, aspect, etc. and estimate percent of exposure by mentally "lumping" the exposed mineral soil on the site into one part of the site and then record the appropriate attribute range on the data

			sheet or in the GPS.
	Mineral Soil Exposure On-site (Detailed Inventory)	(Areal extent) or (Percent cover)	Conduct a systematic plot survey and record the percent of exposure or the total areal extent of the mineral soil exposure on the data sheet or on the GPS.
	Mineral Soil Exposure Off-site (Detailed Inventory)	(Areal extent) or (Percent cover)	Identify an area located near the site that has the same vegetation type, slope, aspect, etc. and conduct a systematic plot survey and record the percent of exposure or the total areal extent of the mineral soil exposure on the data sheet or in the GPS.
	Composition	(Percent clay, sand, silt) or (clay, sandy clay, silty clay, sandy clay loam, clay loam, silty clay loam, sandy loam, loam, silt loam, sand, loamy sand, silt)	Conduct a systematic plot survey and record the percent soil composition and/or the type of soil (based on composition) on the data sheet or in the GPS. Note: In most cases soil samples will have to be analyzed in a laboratory setting rather than in the field.
	Profile	(Depth of O, A, E, B, C, R horizons)	Conduct a soil core sample of the site and record the depth of each soil horizon on the data sheet or in the GPS.
	Compaction	(Penetration Resistance in PSI)	Conduct a systematic transect survey using

			penetrometer and record the penetration resistance on the data sheet or in the GPS. Note: The best time to inventory compaction is in the spring (or 24hrs after soaking rain). If soil is too wet, then compaction will be underestimated. If soil is too dry it will be overestimated.
Fuel Availability	Abundance (rapid inventory)	(Abundant, Moderate, Scarce, None)	Determine the amount of small downed woody debris located near the site and record the appropriate attribute choice on the data sheet or in the GPS.
	Abundance (detailed inventory)	(actual amount)	Conduct a systematic transect survey and record the number of small downed woody debris located at each of the intervals of the transect on the data sheet or in the GPS.
	Distance	(<30 meters, 30-60 meters, >60meters)	Determine the distance from the center point of the site to small dead and downed woody debris located near the site and record the appropriate attribute choice on the data sheet or in the GPS.
Water Resources	Distance	(<30 meters, 30-60 meters, >60meters)	Determine the distance to closest

			body of water from the center point of the site and record the appropriate attribute choice on the data sheet or in the GPS. Note: If the site is recorded with a GPS, this information can be gathered using GIS.
	Name	Unique to each wilderness area.	Record the name of the closest water body to the site on the data sheet or in the GPS.
	Stream Bank Trampling	Actual percent of stream bank that is trampled.	Determine the percent of stream bank that is trampled and record in on the data sheet on in GPS. Note: If no stream bank is located near the site or would be damaged from use of the site, then mark NA in data field.
<i>Stock Use</i>	Evidence of stock	(None, feed/manure, manure odor/dishing)	Determine the level of evidence of stock and record the appropriate attribute selection on the data sheet or in the GPS.
	Forage Availability	(Yes, No)	Determine if there is forage available near the site and record the appropriate attribute selection on the data sheet or in the GPS.
	Distance to Forage	(Actual distance) or (<30 meters, 30-60 meters, 60-100meters, >100 meters)	Determine the distance to the nearest available forage from center point of site

			(typically an area greater than 1 acre) and record the distance or appropriate attribute selection on the data sheet or in the GPS.
	Name of Closest Forage	Unique to each wilderness area.	Record the name of the closest forage area (if applicable) on the data sheet or in the GPS.
<i>Site Development Level</i>		(None, primitive structure, temporary structure, permanent structure) or (none, one fire ring with or without primitive seat, more than one fire ring with other major developments)	Determine the level of development of the site and record the appropriate attribute selection on the data sheet or in the GPS. Note: GPS locations of structures may be useful in monitoring/managing sites.
<i>Site Cleanliness</i>		(Evidence of fire, one fire scar/trash, > one fire scar and/or abundant trash and /or human waste/manure)	Determine the site's cleanliness and record the appropriate attribute selection on the data sheet or in the GPS.
<i>Presence of Human Waste</i>		(Yes, No)	Determine if human waste is present on or around the site and record the appropriate attribute selection on the data sheet or in the GPS.
<i>Social Trails/ Access Trails</i>		(Actual number) or (no more than one, 2-3, >3) or (none, one discernible, two discernible/one well defined, > two discernible/one well defined)	Determine the number of discernable social trails greater than 10 feet in length that lead away from the site and are related to the use of the site and record the

			number or appropriate attribute selection on the data sheet or in the GPS.
<i>Campsite Size</i>	Campsite Area (Rapid Inventory)	(0-150 square meters, 152-450 square meters, greater than 450 square meters) or (less than 20 square feet, 21-100 square feet, 101-500 square feet, 501 to 1000 square feet, greater than 1000 square feet)	Visually estimate the size of the campsite by breaking the site up into smaller geometric shapes and mentally calculating the total area of the site. Record the attribute selection on the data sheet or in the GPS.
	Campsite Area (Detailed Inventory)	(Actual size)	Identify the center point of the site and measure the distance to the edge of the site at each azimuth (N, NE, S, etc.) or at an established incremental degree on the compass (10, 20, 30, etc.). Draw site map that includes measurements and permanent feature. May help to use graphing paper. Break the site up into smaller geometric shapes and calculate the total area of the site and record the total on the data sheet or in the GPS. Note: Computer programs exist to calculate the size of the site based on site transect data.
	Campsite Area (GPS)	(Actual size)	GPS the exact boundary of the site

			as a polygon. Site size can be determined by the GPS file or by using GIS.
	Campsite Capacity/maximum party size	(Number of tent sites/party size)	Estimate the capacity of the site by considering the number of fire rings and number of tents sites available and record on the data sheet or in the GPS.
<i>Barren Core Area</i>	Barren Core Area (Rapid Inventory)	(absent, 5-50 square feet, 51-200 square feet, 201-500 square feet, greater than 500 square feet)	Visually estimate the size of the barren core area (area with compacted soils that is void of organic materials due to human use of the site) by breaking the site up into smaller geometric shapes and mentally calculating the total area of the site. Record the attribute selection on the data sheet or in the GPS.
	Barren Core Area (Detailed Inventory)	(Actual size)	Identify the center point of the site and measure the distance to the edge of the barren core area (area with compacted soils that is void of organic materials due to human use of the site) at each azimuth (N, NE, S. etc.) or at an established incremental degree on the compass (10, 20, 30, etc.). Draw site map that

			<p>includes measurements and permanent feature. May help to use graphing paper. Break the barren core area up into smaller geometric shapes and calculate the total area of the barren core area and record it on the data sheet or in the GPS.</p> <p>Note: Computer programs exist to calculate the size of the barren core area based on site transect data.</p>
	Barren Core Area (GPS)	(Actual size)	<p>GPS the exact boundary of the barren core area as a polygon. Site size can be determined by the GPS file or in GIS.</p> <p>Note: This method may not be effective if the size of the barren core area is extremely small or the accuracy of the GPS unit is poor (Recommend using GPS units with sub-meter accuracy)</p>

Social Impacts:

The purpose of the social impacts information is to provide managers with data on the amount of social impact and the social setting of the campsite. This information is useful for monitoring the elements of solitude and the recreation experience.

Indicator	Elements	Attributes	Methodology
<i>Distance to Trail System</i>		(Actual Distance) or (<30 meters, 30-60 meters, >60 meters)	Estimate or measure the distance to the closest trail system and record the distance or appropriate attribute selection on the data sheet or in the GPS.
<i>Campsite Visibility</i>	Visible from trail	(Yes, No)	Determine if the campsite is visible from the trail system and record the appropriate attribute selection on the data sheet or in the GPS. Note: It is helpful to have a one person stand on the trail and one person in the site with bright clothing on to determine the site's visibility from the trail.
	Visibility from other sites	(Yes, No) (Actual number of sites impacted)	Determine if the campsite is visible from other site located nearby and/or the total number of sites that the site is visible from and record the number and/or appropriate attribute selection on the data sheet or in the GPS. Note: If other sites are located nearby, it is helpful to have a one person stand in

			the nearby site and one person stand in the site with bright clothing on to determine the site's visibility from the other site.
	Site Screening from other sites/ intersite visibility	(None, partial, complete) or (low, medium, high)	Determine the level of screening or level intersite visibility for the site and record the appropriate attribute selection on the data sheet or in the GPS.
	<i>Noise From Other Sites</i>	(Yes, No)	Determine if noise from users of sites located nearby could be heard on the site and record the appropriate attribute response on the data sheet or in the GPS.
	<i>Distance To Other Sites</i>	(<30 meters, 30-100 meters, >100 meters) or (< 500 feet, >500 feet) or (actual)	Estimate or measure the distance from the site to other site that are nearby and record the distance or the appropriate attribute selection on the data sheet or in the GPS. Note: If site is recorded with a GPS then distances between sites can be determined using GIS.
	<i>Presence of Prehistoric/Historical Artifacts</i>	(Yes, No) or (None apparent, Some site indicators apparent)	Determine if there is evidence of historic or prehistoric artifacts or use of the site and record the appropriate selection on the data sheet or in the GPS.

			Note: It is recommended monitoring personnel discuss with an archeologist what indicators or artifacts of historic and prehistoric sites are common for the individual wilderness areas.
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