



Dixie Wilderness Monitoring

Campsite Monitoring

INTRODUCTION:

The objective of the Dixie National Forest Wilderness Campsite Monitoring Project is to monitor wilderness campsite conditions in Pine Valley Mountain Wilderness, Box Death Hollow Wilderness, and Ashdown Gorge Wilderness in order to make informed management decisions. The goals of the project are as follows: 1. To develop a comprehensive monitoring system to monitor the impacts of recreational use on the natural resources that will set a high, but achievable standard for monitoring the forest. 2. To develop a monitoring program that will include a clear, complete, and reliable protocol to ensure valuable data is generated and entered into a centralized data system for future use. 3. To develop a monitoring system that will help define and monitor the limits of acceptable change to ensure that changes in the forest resources do not exceed established limits over time.

The project will achieve the above by obtaining baseline data on targeted resource elements and re-sampling these resource elements periodically, and using the obtained data to monitor change over time. Management decisions must attempt to maintain current wilderness conditions at levels that are in compliance with established standards and parameters. Many of the standards and parameters are in place in the Land and Resource Management Plan for the Dixie National Forest, but will need to be modified as more information is collected.

The procedures used in the Dixie Wilderness Monitoring (DWM) Project have been adapted from similar procedures tested and published in the scientific community. The DWM GPS data dictionary used is based on Cole's (1989) worksheet with the modification of making it computerized and the addition of some targeted data. The Dixie National Forest Wilderness Monitoring Project was designed to eliminate most field paperwork and manual data entry into a spreadsheet. Ensuring that inventory and monitoring protocols produce reliable data is important and will be an ongoing process that will lead to modifications of the project in the future. Collecting reliable data also

depends highly on the efforts of the DWM team members to adhere to the protocols, to thoroughly complete every survey, and strive to maintain consistency in their work. Non-backcountry skills required for DWM members include proficiency with a GPS unit; computer proficiency with GPS and GIS programs, word processing, spreadsheet, and database programs; and a background in natural sciences.

An early season training should be conducted every year to help orient both new and old members. All members should be similarly trained to help maintain consistency in data collection. The training should be organized so wilderness coordinators, DWM team members, and other people working in the wilderness area can attend. At the meeting, season objectives, protocol modifications, scheduling, and other concerns can be discussed.

This manual describes every aspect of the DWM project in its current state of development. It includes a description of trip preparation, data and photo management procedures, and a protocol. As data are gathered with the use of the program, DWM team members need to work with wilderness managers in drawing valuable conclusions and deciding what kind of information is important. This manual does not describe the specifics of how to interpret the Dixie National Forest Wilderness Campsite Inventory and Monitoring Project results.

PREPARATION FOR FIELD WORK:

In preparing for fieldwork there are a number of monitoring elements that a DWM member needs to consider. Important factors to consider in preparation are weather, transportation, food, sufficient amount of monitoring supplies (BATTERIES and FILM), as well as many other items pertaining to personal safety. Due to diverse weather patterns on the forest, a DWM team member needs to be prepared for a variety of environmental conditions to ensure the safety of the individual. It is essential that all DWM team members have the proper monitoring training before entering the field. It is also essential for a DWM team member to have a GPS unit that is capable of holding multiple data dictionaries, as well as storing all of the data needed to complete campsite

monitoring. Before entering the field for a re-evaluation of a campsite, a DWM team member must obtain all of the data recorded from the past survey visits to ensure that quality data is generated. Data may consist of pictures, GPS coordinates, and past targeted resource data. The data should not be used to form any preconceived notions of the campsites' present conditions. Rather it should be used to locate the individual site, point from where the past picture was taken, and form objective monitoring items. The transport and care of GPS units, photos, and maps is the responsibility of the survey crew.

MATERIALS

- 50-Meter Measuring Device
- At Least 15 Flags
- Digital Camera
- Instruction Manual
- Frissel Ratings and Coverage Estimate Comparisons
- Noxious Weed Field-Guide (optional)
- GPS Unit
- Two-Way Radio
- Extra Batteries

IN THE FIELD:

The campsites to be surveyed should be determined subjectively. Important campsites to survey are less-impacted sites, because they are more likely to show change, either degradation or recovery, than heavily impacted sites. For this reason, focus on less-impacted sites but do not forget to sample all condition classes.

A "site" is defined as an area with obvious human-caused impact. This includes vegetation or soil disturbance, fire scarred rocks, or "improvements" such as stock ties, log benches, tree damage, etc. Use maps, photographs, and previous survey information to locate campsites.

The first step once a site has been chosen, or a new site found, is to determine the "barren core camp area" and visually mark the area with flags. Generally, this area is considered to be the area of barren ground within the area of the site. (See "Campsite Area" below). The DWM team member should then log the area of the barren core camp area. If there is not a barren core area that is large enough to log, then the DWM team member should flag the complete campsite area for photograph purposes. Next, the DWM team member should log the area of the site and complete the data dictionary. The DWM team member should then photograph the campsite and plot the photo point(s). (See "Photo" below). When previously unrecorded sites are located, record them as new sites in the comment data area before performing the survey. After returning from the field, DWM team members and wilderness managers should work closely together to designate a new site number. That number should be recorded in the computer data system.

Be sure to distinguish natural conditions from those that are human-caused. For example, when looking at under-story vegetation loss on sites, it is important to examine the surrounding area; does there appear to be actual differences between on-site vegetation and adjacent, unused areas? Lightning or wildlife damage to trees should not be mistaken as human or stock damage. Sometimes mineral soil is naturally occurring such as on floodplains, or areas where soil development is slow. Include only human-caused impacts in the monitoring process.

The monitoring crew should work in teams of two when possible to help increase consistency in the results. Ideally, field personnel need to be trained together and calibrate off each other to ensure a quality result. Any individual conducting campsite monitoring needs to be trained by experienced monitoring personnel. Sloppy and incomplete data collection results in unreliable data. Do not let your personal prejudices toward an area result in biased data.

COMPLETING THE DATA DICTIONARY

The first 17 data areas of the data dictionary are for data management and general information about location; what type of environment the site is located in; distance to

trails, water, and other campsites; and information about the surrounding area. This creates a profile of the site's characteristics. The last 11 data areas are targeted data areas, and are used for calculating the Impact Index. These targeted data areas will be used to evaluate the degree of human-caused impacts in the site (described below in Data Management).

The data that is entered into the data dictionary is obtained from monitoring the entire site, not just the barren core camp area.

Completely filling out the data dictionary in its entirety is important in successfully monitoring wilderness campsites. Though completion of the data dictionary is important, some of the data areas do not have to be filled in to complete the monitoring process; whereas, all of the targeted data areas are required for the completion of that monitoring file. If a data area is required, the *GeoExplorer 3* GPS unit will not let you proceed with completing the data dictionary until the data area is complete.

The following is a breakdown of the meanings of each component in the data dictionary:

- **Date:** The date should appear automatically, but if it does not, it should be entered in yr/mo/day format with no slashes. For example, July 5, 2000, would be 000705.
- **Time:** The time should automatically appear in the time data area in 24-hour form.
- **Wilderness Area:** The wilderness area should be selected from the menu of options. (Pine Valley MT Wilderness, Ashdown Gorge Wilderness, Box Death Hollow Wilderness)
- **ID #:** This number is very important for data management as it identifies a survey site permanently. The number consists of the date and the designated campsite number. For example: A crew begins a campsite survey on 010805 in the Pine Valley Mt Wilderness at campsite number 026. The inventory number the DWM crew would use would be 010805-PV026.

- **Inventoried by:** Enter the initials of the person or people involved with the particular survey in the data area.
- **Frissel Rating:** This is a quick method for evaluating the condition of a campsite. It is based on a scale of 1 - 5, 1 meaning least impacted and 5 meaning the heaviest impact. (See Appendix). Select the appropriate menu option.
- **Type of Site:** This identifies the type of site being inventoried (campsite, stock tie area, or other). Select the appropriate menu option.
- **Site Location:** This identifies in what type of habitat the site is located (meadow, forested area, or canyon). Select the appropriate menu option.
- **Closest Trail System:** Identify the closest named trail system that is located near the campsite and enter the name.
- **Distance to Constructed System Trail:** Determine the distance from the edge of the site to the trail. This does not need to be precise. Determine whether or not the trail is located within 30 meters of the trail or not and select the appropriate menu option. If the trail runs right through the campsite make a comment in the comment data area of the data dictionary. Note: It is important to distinguish between "user-made trails" and "system trails".
- **Campsite Visible From Trail:** Determine if the campsite is visible from the system trail and select the appropriate menu option (yes/no).
- **Distance to Water:** Determine the distance from the edge of the site to water and select the appropriate menu option. If there is no water within a quarter-mile of the campsite then select the "NA" menu option.
- **Number of Campsites Within Sight:** Determine the number of campsites within sight. If you are located at a lake and can see sites across the lake mention these as well. Be aware that even though you can't see a non-occupied site a bright colored tent might be visible. One way to test the visibility is to have a partner walk through nearby sites with a brightly colored item and note if they can be seen. When you decide the correct number of sites visible, enter the number in the data area.
- **Sound From Adjacent Campsites:** Determine if there are camps that can be heard from the site. Remember that water is a good reflector of sound. If sites

are located near water sounds may be audible across a lake. Select the appropriate menu selection (yes/no).

- **Firewood Availability:** For monitoring purposes firewood is considered to be dead wood only. This is naturally occurring dead wood, not wood moved to sites by users. Further, wood that is suitable for fires is defined as down on the ground and no thicker than 2 inches in diameter. Determine whether the closest source is closer or further than 30 meters from the site and select the appropriate menu option.
- **Noxious Weeds:** Determine if there are any noxious weeds present at the campsite and select the appropriate menu option (yes/no). Noxious weeds are weeds listed as noxious by the state of Utah. If there are noxious weeds present at the campsite note the species of weed in the comment section. It may be helpful to carry a noxious weed field-guide for the state of Utah to identify the weeds if a DWM member is unfamiliar with the noxious weeds in the area.
- **Photo:** Photos are taken for two reasons. First, they are necessary in relocating the site, especially when a distinguishing landmark is used in the picture. Second, it's a visual record of the site and can be used as a history of how the site has evolved. When taking a photo, a point feature ("Photo Point (1), (2), (3), (4)) should be taken to mark the exact point from which the picture was taken. This is to assure that the picture will be taken from the same point each time a survey is performed. Maintaining a record of which photos go with which campsite numbers is also very important. Try to include the boundary flagging in the photo as well as any significant landmarks. A digital camera is mandatory for Dixie National Forest Wilderness Campsite Monitoring Project.
- **Comparative Vegetation Cover and Mineral Soil Exposure:** Conditions on-site are compared with adjacent, unimpacted off-site conditions. Remember that the site's boundaries extend to the edge of the trampled vegetation. It is extremely important that the off-site comparison area be as similar as possible to the impacted on-site area, aside from a lack of obvious human-caused impacts. Select an off-site area with similar plant species, both over-story and under-story. If the

on-site area is severely impacted, this may be difficult since vegetation may be missing or altered; look for similar soils, slope, landform, and aspect.

For the purposes of site monitoring, mineral soil will be considered soils where the duff layer is missing due to human use. The duff layer is comprised of partially decomposed to fully decomposed organic materials such as leaves, needles, etc. The dusting of recently fallen needles or leaves is the litter layer, and should not be included as organic soil. Mineral soil will range from having only a little granular soil, to being primarily granular material. Sometimes naturally occurring mineral soil will be encountered, such as on flood plains. This should not be measured as a human-caused impact, which is why a comparative area is documented. The importance of the mineral soil measurement, based on this definition, is that once the duff layer is gone, the site is subject to much more erosion and compaction.

Estimate percent coverage by mentally "lumping" the exposed mineral soil into one part of the site. Then, imagine dividing the site roughly into quarter sections. If the area of exposed mineral soil would cover less than one quarter of the site, divide that quarter-area again into quarters. If the total exposed mineral soil would cover less than that smaller quarter section, then it falls into the 0-5% coverage class. If the exposed mineral soil would cover more than one of the small quarter-sections, but less than one quarter of the total site, then it falls into the 6-25% coverage class, and so on. Also use the percent coverage comparison sheets (see Coverage Appendix). Select the appropriate coverage class from the data area menu.

Use this same method to estimate total percent ground cover: mentally "lump" all on-site vegetation onto one part of the site and estimate the total percent of the site that the plants would cover. Select the appropriate coverage class from the data area menu for the site. Repeat this process on the comparative off-site area.

- **Tree Damage:** Tree damage should be calculated using the number of damaged trees over the total number of trees. This should be a percentage of the trees on or visible from the site. Inspect all sides of trees considered to be on site. If damaged trees are off-site, but associated with the site, record damage if it can be seen from the site. Do not include damaged trees within the boundaries of other sites. Damaged trees are either “scarred” or “felled” trees. The term “scarred” means that the tree includes branches broken off, nails, wire, rope burns, ax marks, engravings, etc. The term “felled” means trees that have been completely cut down. Both “scarred” and “felled” tree should be entered into the targeted data area.
- **Root Exposure:** As with tree damage above, indicate root exposure in terms of the number of trees with exposed roots over the total number of trees with roots apparently on site. The total number of trees with roots on-site is defined as any tree with roots that enter the site. A tree may be located off-site, but as long as the roots enter the site, it should be counted. Indicate only trees with roots that appear to have been exposed by soil erosion or trampling by stock. Many trees in shallow soils will have naturally exposed roots; compare with an unused adjacent area to help identify natural root exposure. If in doubt, do not include trees in the total. Try to judge which tree a root comes from by tracing it back toward the tree. In general, root exposure will only occur where there is also extensive exposed mineral soil or loss of the duff layer. However, naturally exposed roots that show wear from human or horse use should be included in your assessment.
- **Evidence of Stock:** Record whether or not stock feed, manure, odor from manure, and dishing is on or associated with the site and select the appropriate menu option. Dishing is the removal and compaction of soil at the base of a tie-area caused by the stock animal pawing the ground.
- **Development:** Rate according to the number and type of facilities found. Development includes any visitor-made construction such as rock seats, stock holding pen, logs cut for stools, etc., but do not include fire rings in this rating as it is included in the next item.

- **Cleanliness:** Count the number of human-caused fire scars (including fire rings), also including any you might have naturalized. These are still scars that will take time to heal completely. Also note the presence of any litter. Since human waste will generally not be inside the site boundaries, this can be included if in an adjacent area associated with the site and not associated with any other site. The same may be true for litter.
- **Social Trails:** Indicate the number of social trails associated with the site; social trails are generally short, user-established trails that radiate from a site, connecting it to other sites, water sources, firewood, toilets, or views. Include any trail radiating from the site other than system trails. Social trails are distinguished as having any continuous, defined tread for more than five feet, and radiate from a site.
- **Barren Core Camp Area:** This should be measured as total on-site area from which living plants are absent for 90% or more of its surface. When measuring this impact over a continuous area, ignore small patches of vegetation that represent less than 10% of the total barren area. Include any discontinuous or satellite areas in this measurement, such as stock holding areas, separate tent spaces, etc. A rough estimate of the total camp's area will be estimated. Using the flags, that were set when first arriving, as the boundary, estimate the area by cutting it into geometric patterns such as triangles, squares, rectangles, circles, and squares. For example: rectangular sites can be computed most easily by measuring the site's width and length to the nearest foot, and then multiplying these to obtain a square-foot area. If there are any significant discontinuous areas of impact on-site, estimate their total area in a similar width-by-length manner, and include it in the total camp area. Calculate the campsite area and select the appropriate menu option. Note: The exact area will be calculated by using the GPS data collected when an area is plotted. This data will be obtained when a DWM member returns from the field and downloads the logged area, but for the purposes of the Impact Index, a physical measurement must be taken.

USING THE *GeoExplorer 3* GPS UNIT

The ability to correctly use the GPS unit is crucial to the DWM program. Before entering the field, a DWM team member needs to be trained by an experienced *GeoExplorer* user and have a complete understanding of how to operate the unit. Manuals and interactive CD operation guides are available to DWM team members at the Dixie National Forest headquarters in Cedar City. The information below is not intended to act as a replacement, but rather a supplement to the user guides.

Before entering the field to survey wilderness campsites a DWM member should make sure that the *GeoExplorer 3* GPS unit they will be carrying has the standardized Dixie National Forest Wilderness Campsite Monitoring data dictionary correctly downloaded on the unit.

1. To turn the unit on press the black power key (Φ). The unit will boot up and start locating available satellites. If the words “Too few satellites” appear on the bottom of the screen, try spinning around in place or slightly moving until the message disappears.
2. Press the blue function (Fn) key, followed by the “OPTION” key. (The word “MENU” is printed below the key in blue.) This will bring you to the “Main menu” screen.
3. Using the arrow keys, press the right arrow key once until the “File” option is highlighted.
4. Press the “ENTER” key. A screen will appear with the words “Create new file” in a highlighted box.
5. Press the “ENTER” key. The *Explorer 3* GPS unit will ask you which feature you would like to log: “Barren Core Area”, “campsite Area”, “Photo Point (1)”, “Photo Point (2)”, “Photo Point (3)”, or a “Barren Point”. In most cases a “Barren Core Area” will be the appropriate selection to start with. Only if the campsite being monitored has very small barren core camp area, one meter by one meter, for example, would you want to plot it as a “Barren Point”. The GPS unit will also ask you if you would like to “Begin GPS Logging” with

the word “Now” highlighted in a box. If you would like to log the campsite area at this time press the “Enter” key. At this point the GPS unit will start to log points at the rate of one every three seconds. It is recommended to log all areas and points before completing the data dictionary. If you choose to log the barren core camp area now, make sure that you have marked the area of the area with your flags, to assure that the barren core camp area will be recorded consistently. Once the GPS unit starts to log the area do not try to back-trace your steps without pausing the unit first or this will lead to inaccurate data on a map. It is also important to remember where you started to log the area. The logging of points can be paused by pressing the “LOG pause” key that is located below the “DATA” key. This should be done only after you have logged the entire barren area or the possibility of losing data exists. When logging a point the GPS unit needs to stay stationary until at least 180 points have been logged.

6. After logging the barren core camp area press the “CLOSE” key. This will bring you back to the feature selection menu (“Barren Core Area”, “Campsite Area”, etc).
7. Select the “Campsite Area” feature. The GPS unit will once again ask you if you would like to “Begin GPS Logging”. Highlight the “Yes” box and press the “ENTER” key. Make sure you know where your campsite area boundaries are, and where you started logging the GPS points. After logging the entire campsite area press the “LOG II” key to pause the logging.
8. The *GeoExplorer 3* Unit will automatically put you into the Dixie National Forest Wilderness Campsite Monitoring data dictionary. The targeted information area titled “Date” should be highlighted. The date should automatically appear in the data area.
9. Use the down arrow key to select the next targeted information area, “Time.” This information should also appear in the data area.
10. Use the down arrow to select the next targeted information area titled “Wilderness Area”. Once the “Wilderness Area” selection is highlighted,

press the “ENTER” key. This action will bring the “Wilderness Area” data menu up on the screen.

11. Select the appropriate wilderness area by using the up or down arrow keys until the correct area is highlighted, then press the “ENTER” key. This action will return the user to the next targeted information area titled, “Id Number.”
12. Press the “ENTER” key to enter the campsite identification number. This action will bring the manual data entry area up on the screen. The manual data entry screen is navigated by using the arrow keys to highlight the appropriate letter or symbol. To select the letter or symbol press the “ENTER” key when the desired selection is highlighted. When the data entry is complete, use the arrow keys to highlight the word “CLOSE” at the bottom of the screen. This action will take you back to the next targeted information area in the Dixie National Forest Wilderness Monitoring data dictionary titled “Inventoried By”.
13. Press the “ENTER” key and follow the directions in step #10 to enter the initials of the person executing the monitoring survey.

Entering the correct data using steps 8-10 can complete the entire remaining Dixie National Forest Wilderness Campsite Monitoring data dictionary.

14. Press the “CLOSE” key to exit from the data dictionary.
15. The *GeoExplorer 3* unit will then bring you back to the feature selection menu. At this time you should locate the point the photo(s) will be taken from. Once the photos have been taken, select the appropriate “Photo Point” feature and log the photo point.
16. The *GeoExplorer 3* unit will display a screen with the word “Comment” on it. To enter any comment about the photo point press the “ENTER” key, and type in the comment. When you are done or you wish not to enter a comment you must wait for the GPS unit to log at least 180 point. When it has done so press the “CLOSE” key.
17. The GPS unit will once again bring you back to the feature selection menu.

This will complete your survey for that particular wilderness campsite. The unit will display the feature selection screen, and you are ready to start another campsite survey. Note: It is recommended to turn the *GeoExplorer 3* GPS unit off if there are no more campsites to survey in the area to conserve the batteries. Before shutting the GPS unit off, make sure that all of the data has been stored to avoid a costly mistake and the complete loss of the data. To turn the GPS unit off, press and hold the power key for a few seconds.

Dixie Wilderness Monitoring

Data Management

INTRODUCTION:

Maintaining the data that is collected in the field in an orderly manner is very important. The DWM project is completely based on observational data that is electronically entered into a GPS unit in the field and downloaded into a computer database in the office.

The data collected from DWM campsite monitoring surveys should be downloaded in a timely fashion to ensure the security of the stored information. The downloading of the data should be handled by trained personnel to use the applicable computer programs, preferably the wilderness manager and DWM member together. The data should be downloaded into *GPS Pathfinder Office* and then exported to other programs that will facilitate management purposes. One program data should be exported to is *Microsoft Excel*. In the *Microsoft Excel* program there should be a formatted Dixie National Forest Wilderness Campsite Monitoring data spreadsheet. This file should be saved as DWM Datasheet Templatexls.xls. The data that is exported from *GPS Pathfinder Office* to a new *Microsoft Excel* spreadsheet will be cut/copied and pasted into the formatted data spreadsheet. The formatted Dixie National Forest wilderness Campsite Monitoring data spreadsheet will then calculate the Impact Index. Below is an explanation of how the Impact Index is calculated.

Calculating the Impact Index

The data collected in the last nine data areas, the targeted data areas, are used to calculate the degree of human-caused impacts in the site, by rating each targeted data area 1, 2, or 3. It is important to be objective and consistent when assigning these ratings. These ratings are then multiplied by an assigned weight and added to obtain the Impact Index. The weights correlate with the relative importance of each targeted data area. It is possible that some factors will not apply to the site. For example, the site might naturally have no trees. Or it might be located entirely on bedrock or sand where plants could not grow anyway. This does not affect the composite score, because it becomes a part of the first 20 points that form the base for every site regardless of impacts. For each targeted data area, select the menu option that most appropriately describes those conditions on the site.

The nine data areas are assigned a weight according to its relative importance and permanence of impact. The data areas and weights are as follows:

Data Area: Weight

- Vegetation loss: 2
- Mineral soil increase: 3
- Tree damage: 3
- Root exposure: 3
- Stock evidence: 2
- Development: 1
- Cleanliness: 1
- Social trails: 2
- Camp area: 3

Types of impact that are easily fixed receive the lowest weighting (1). Impacts that are fairly contained, or could recover fairly quickly with less pressure, such as vegetation, are rated a 2. Impacts that are lasting or very difficult to restore, such as soil loss or tree damage, receive the heaviest weight (3).

Finally, to derive the impact index, multiply the ratings from these nine targeted data areas by their weights and then add these numbers to find the Impact Index for the site. The range of the Impact Index has been divided into four "condition classes". They are as follows:

- I. Minimum Impact - sites with an index of 20-30. Most of these sites could recover rapidly.
- II. Moderate Impact - sites with an index of 31-39.
- III. Heavy Impact - sites with an index of 40-49.
- IV. Extreme Impact - sites with an index of 50-60

It is important that a DWM team member knows how the Impact Index works, but the formatted Dixie National Forest Wilderness Campsite Monitoring data spreadsheet will automatically calculate the data for management purposes.

Dixie Wilderness Monitoring

Digital Photography

INTRODUCTION:

The DWM uses digital photography for photo documentation. The advantages of digital over traditional are that the entire process takes less time and costs less money due to the fact that the chemical, photo-development process is eliminated and replaced by computer downloading and laser printing. In addition, access to photos is easier and is compatible with GIS systems. Another advantage with the digital photography is the photo quality can be inspected in the field and poor quality photos can be identified, eliminated, and retaken. The materials and procedures written here are those used for the 2001 field season and may change through time. Photos are a crucial part of the DWM Project.

MATERIALS:

- Digital Camera: Olympus D-460ZOOM
- Camera Carrying Case

- Software: Software for Olympus D-460ZOOM Digital Camera
 - *CAMEDIA Master filmless digital camera software*
- Accessories:
 - Serial Cable for IBM PC Compatible Computer (RS-232C PC serial Cable)
 - SmartMedia Cards: (1) pre-formatted Olympus SmartMedia SSFDC-8MB, 3.3volt card

PROTOCOL/ METHODS:

For instructions on how to use the digital camera, read the Owner’s Manual. Photos should be taken at the high quality (HQ) setting to ensure quality of the photo and maintain sufficient storage memory. The camera holds two CR-V3 lithium battery packs, and one removable SmartMedia card. It is important for DWM team members to make sure that the batteries are fully charged and the SmartMedia card has full storage capabilities.

The Software for Olympus D-460ZOOM Camera needs to be installed on the computer DWM team members will be using. There is a CD and a manual for installing the *CAMEDIA Master filmless digital camera software*. Follow the manual’s instructions for installation. This program will allow DWM team members to download, view, edit, and save the photos. Any edits that are made to photos should not alter the physical appearance of the site.

All photos need to be saved as high quality TIFF files. Name photos by their inventory number with a dash and the number of the picture for that site. For example: If a DWM team member inventoried site number 010713-AD01 (Ashdown Gorge Wilderness site 01 inventoried on July 13, 2001) then the photo should be saved as 010713-AD01-1 for the first photo and 010713-AD01-2 for the second, and so on. All photos must be saved in the correct DWM file. Photos are organized in the DWM file by the name of the wilderness, and then the Inventory/Photo number.

The basic procedure for saving and viewing photos is very simple and is clearly written in the manual. The following is a quick reference.

1. Connect one end of the Serial Cable to the RS-232C port on the PC (in the back) and the other end into the camera. Note: Make sure the camera is off.
2. Make sure the correct SmartMedia card is in the camera.
3. Switch the camera ON.
4. Open the *CAMEDIA Master* program.
5. Double-click the icon that says “My Camera”.
6. Double-click on the appropriate file in the folder.
7. Double click on the correct photo file to open the group of images. The image will appear on the screen in thumbnail size photos. They will appear as JPEG files. Make sure to save them as TIFF files.
8. To access an individual photo, double-click the photo. At this point the photo can be edited.
9. Save the image in the appropriate file folder and the inventory number it is associated with, as a TIFF file.
10. Once finished saving all necessary photos, delete them on the SmartMedia card by using the directions found in the manual.

Dixie Wilderness Monitoring Testing and Refinement of Techniques

The elements monitored and their impact levels change with the changes in recreation, use level, weather, etc. Thus, a crucial part of the DWM project is the testing and refinement of the techniques used. The evaluation of the DWM project will be approached at two levels, in the development stage and the long-term stage.

The development stage is the stage at which the project is being implemented. In this stage of the monitoring process DWM team members and wilderness managers should work together to compile all of the elements that work well and do not work well. It is

recommended for DWM team members to write their thoughts and impressions down while in the field to avoid forgetting them. The DWM team members should report any perceived problems in a timely manner to the appropriate supervisor for review. A change in monitoring techniques should be a collaborative decision made by the appropriate wilderness managers, and should apply for the entire Dixie National Forest Wilderness Campsite Monitoring Project.

Another step in the evaluation process for the development stage of the DWM Project is an estimation of measurement error. Although error is inherent to measurement systems, for monitoring purposes an idea of the percent of error needs to be known. Wilderness managers need to know how accurate their data is for change in natural resources over time, and how much of the perceived change is due to the interpretations and biases of two different DWM team members. Therefore, it is important to use techniques with little inherent error, mandate proper training and documentation, as well as constantly measure the amount of error. The amount of error for the Impact Index, from Cole's worksheet, used in the DWM project has been scientifically tested in the past and has proved to have a high chance of detection, thus proving its accuracy.

The second approach to testing and refining should occur in the long-term stage of the DWM project. The long-term stage is defined as evaluation throughout the entire life of the project. As stated above, changes influencing monitoring accuracy will increase the need for the evaluation of the project. Most of the changes will be observed and reported by the DWM team members while performing re-evaluations of the wilderness campsites. It is important for wilderness managers to closely monitor the changing elements and adjust the DWM project accordingly.

Dixie Wilderness Monitoring Budget

The costs of material and personnel needs for calculated for the current state of the DWM project and are subject to change. The budget excludes any and all personal gear that may be required for the completion of the DWM project. These are approximate costs for two DWM team members.

• Personnel	(1 GS4 & 1GS5 Seasonal)	\$10,800.00
• Jeep Cherokee	(June - August)	\$678.00 plus \$.19/mile
• Uniforms		\$550.00
• <i>GeoExplorer3</i> GPS Unit		\$3,500.00
• Olympus D-460 Digital Camera		\$299.00
• <i>Bendix/King</i> two-way radio		\$800.00
• Campsite Marking Flags	(Bundle of 100 Flags)	\$15.00
• Nylon Twine (20Meters)		\$0.76
• Camping Equipment		\$1000.00
Total		\$17,643.75

Dixie Wilderness Monitoring

DWM References

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Frissel Rating Table

(From Frissel, 1978)

Condition Class	Visible Indicators	Management
1	Ground vegetation flattened, but not permanently injured. Minimal physical change except for possibly a simple rock fireplace.	These sites are barely recognizable as camping areas. If not in situations known to be sensitive to use (e.g. wet or slump areas), no management action is necessary. Maintain current use or allow increase if other sites must be closed.
2	Ground vegetation worn away around fireplace or center of activity.	Site change now apparent, but still within acceptable limits. These areas are readily identifiable as campsites and will continue to attract use. Future use should be carefully monitored to detect adverse change.
3	Ground vegetation lost on most of the site, but humus and litter still present in all but a few areas.	A transitional condition. Considerable change in plant cover is evident but few signs of soil problems. This condition might be accepted as normal in high use areas. Modification of current use patterns and intensities may be needed to prevent further change.
4	Bare mineral soil widespread. Tree roots exposed on the surface.	Deterioration is accelerating. If current level and type of use continues, soil erosion, loss of tree cover, and aesthetic degradation are likely. Withdraw use from these sites to allow recovery. Consider artificial rehabilitation. If site is improperly located, permanent closure should be considered. If site is reopened insure that use patterns are adjusted to prevent re-injury.
5	Soil erosion obvious. Trees reduced in vigor, or dead.	Natural recovery will be extremely slow. Sites should be closed permanently and alternate ones located. If the site is crucial to recreation patterns, extensive rehabilitation will be required to return it to acceptable condition.

Dixie Wilderness Monitoring Contents

	<u>Page(s)</u>
1. Project Introduction	1-2
2. Preparation For Field Work	2-3
3. Materials	3
4. In The Field	3-4
5. Completing The Data Dictionary Protocol	4-10
6. Using The <i>GeoExplorer 3</i> GPS Unit	10-14
7. Data Management	14-16
8. Digital Photography	16-18
9. Testing and Refinement of Techniques	18-19
10. DWM Budget	20
11. DWM Project References	21
12. Appendices A–D: SWI Supplemental Information	
A. Frissel Rating Table	22
B. Coverage Class Estimation Guidelines	23

Dixie National Forest Wilderness Campsite Monitoring Program

By

Nicholas J. Glidden
Student Trainee
U.S. Forest Service

Dixie National Forest

July 2001

**The Dixie
National Forest
Wilderness Campsite
Monitoring
Manual**

