



National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science

GRSM Standard Operating Procedure: Image Management

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Purpose

GRSM RMS is tasked with organizing and maintaining a variety of research information, including digital images collected as data as well as images taken to document protocols and procedures. The goals are to make appropriate photos easily retrievable to park staff. The objectives of our digital photo management strategy are to:

1. Store and protect digital photos so as to ensure their long-term integrity and value.
2. Ensure that established best practices for acquiring, managing, and disseminating digital photos are efficient and effective.
3. Ensure ready access to digital photos by park staff, along with clearly-written policies, standards, and guidelines for acquisition, management and storage.

Scope

These guidelines apply to all GRSM RMS staff involved in the image management.

Introduction

The Records Management Handbook (National Park Service 2005) provides explicit direction:

- A standard image format must be used to create and store digital images—GRSM recommends TIFF (tagged image file format) for permanent storage of images due to its lossless compression which means that the image may be edited and re-saved without losing image quality
- Digital image files must have a clear naming convention for identification
- Digital image files must be actively converted or migrated forward into every new software version that is installed, and then checked visually to ensure correct and complete transfer
- Staff should consider preservation-quality printing of at least a sampling of the digital image files to ensure that at least some of the recordation survives an electronic records disaster
- A metadata system must be created for digital image files, identifying critical information about the creation and use of the image files
- Any digital manipulation (e.g., resizing, color modification, cleanup of “noise,” merging of images, etc.) of images must be fully documented as to type of manipulation, reason, when, and why done. The original digital image file must be kept as well as the manipulated file, with each clearly identified

Procedure

Photos taken as part of the project’s data collection protocol are project data that need to be organized, documented and preserved in conjunction with all other project data. Standards established for electronic data file naming, file directory structure, storage, backup, and security will apply equally to digital imagery.

Types of Photos

Photos are taken and used by park personnel for a variety of purposes. Park photo users vary tremendously in their knowledge and access to image software and hardware. It is not possible to anticipate every use of digital imagery, but most photos should fit into one of the following general categories:

- Data: photos collected as data (e.g., photo points for plots or photos taken as part of maintenance facilities assets inventory; or cyclic condition assessments where an object is photographed over time to depict change in its condition
 - o The goal for data photo management is to be able to link the photo to the associated data.
 - o The project’s data processing protocol should contain a detailed section on processing data photos. This protocol should include information such as:
 - File folder structure conducive to data entry and linking
 - Photo naming standard conducive to data entry and linking
 - Field collection method for uniquely linking each photo to its related field data sheet/record
 - Step-by-step procedural documentation

- Incidents: photos taken as evidence or documentation of law enforcement, search and rescue, or other emergency activities
- Administrative: photos of public, staff, or cooperators at work and play; scenic photos
- Project: documentation of a specific project (e.g., fire, construction, restoration) or event (e.g., visit by a dignitary)

Acquisition and Processing

Digital cameras best practices

- Cameras with less than 5 megapixels of resolution are not recommended for photos that will be part of any natural resources data set
- Resolution should be set to 600 dpi or to the highest resolution available; if 600 dpi is not offered, resolution should be set at 1760 x 1168 pixels or higher
- Quality should be set to “super fine” or “high”
- Date and time considerations:
 - o Make sure that the date and time are correct on the camera; accurate camera date and time is important to maintain, it is recorded as the file creation date for each photo and for some formats it is embedded in the photo itself
 - Date and time data are embedded in .jpg and .tiff file headers by most digital cameras; digital headers (EXIF, IPTC data) should be used whenever possible
 - When used in conjunction with a GPS, the date and time of the camera must be set to exactly that of the GPS
 - o Date and time should not be digitally imprinted on the image, this detracts from the image quality
- Digital camera file naming options:
 - o Typically the digital camera will have several file naming options. These may include:
 - Sequential numbering which resets each time a memory card is formatted or a new card is put in
 - Sequential numbering which loops from 0001 to 9999
 - Numbering based on date-photo sequence
 - o Generally, the most useful setting is a date-photo sequence; projects must carefully review the naming options of the project cameras for the most useful convention and must also ensure the same convention is used by all cameras collecting data photos

Image Processing and Storage Best Practices

Photos taken as part of a project's data collection protocol are project data that need to be organized, documented and preserved in conjunction with all other project data. Project data photos should be organized and contained within project folders as per the GRSM Directory Structure SOP.

Incidental or opportunistic photos taken by project personnel are not data photos and can be managed as miscellaneous photos. Miscellaneous photos taken as part of a project can be stored in a subfolder in the photo folder. Subfolder naming conventions depend on what is meaningful for the protocol. This allows the photos to stay with the project, but does not confuse photos that are data-related. These photos may be further processed to become Finished/Processed photos.

Once digital images are acquired, employees will process the images. Images are classified in one of the following categories:

- Raw: original, unaltered photos
 - o Raw image files should be maintained in a project subfolder in perpetuity.
 - o Raw images should be stored in TIFF format as this is the only lossless file format—all other formats (JPG, PNG) result in compression and loss of image data.
- Processed: final products that have been edited, documented, and reviewed for quality

- o Processed images may be stored in any format.

Levels of processing vary between protocols. At a minimum, photo sets should be edited as follows:

- Poor quality photos should be deleted from a photo set, except where the subject is highly unique.
- Medium quality photos should be assessed against existing photos of the same subject in the park photo data set. If a photo duplicates the subject with no enhancement of quality or perspective, it may not be worth saving.

Image Documentation Best Practices

The list below shows some required metadata elements.

- Title—who or what is in the image
- Location—where the image was taken
 - a. When using GPS coordinates to “embed” location information, WGS 84 Decimal Degrees is the only accepted format
- Date—when the image was taken
- Access constraints—who may view the image
- Copyright information—restrictions on using the image (if applicable)
- Contact information—who to contact for further information

Project protocols that involve photography and therefore result in data photos should specifically address processing and documentation requirements. There are multiple ways to document digital photographs. The following is a list of some basic options. These options are not mutually exclusive and are often most effective when implemented in some combination.

- Renaming photographs and/or embedding metadata directly into a batch of files through the use of image management software such as Microsoft Pro Photo Tools (free and easily installed), Adobe Bridge, Adobe Photoshop and Adobe Lightroom;
 - o Such software packages make this a fast and easy process;
 - o This methodology ensures that the metadata associated with the photo is not divorced from the photo itself as can be the case with other methodologies.
- Using strict naming conventions and folder structure to manage photos
 - o For example all photographs taken at plot ‘102’ when it was monitored in 2015 could be stored as follows: Project/Data/Photos/2015/102;
 - o If this naming convention and folder structure is adhered to as well as documented in the protocol one should be able to easily navigate to a specific photo of interest;
 - o This is a simple and effective management technique but requires extreme attention to detail; a substantial drawback is that if a photo is removed from the folder structure it is divorced from all context and metadata;
 - o Each protocol has to be evaluated for proper implementation.
- Embedding the file path to the data image in the protocol database
 - o In addition to strict folder and file naming conventions, some Protocol Leads choose to embed the file path to the related record in the protocol database;
 - o For GIS-based protocols photographs pertinent to location can be directly embedded in the GIS location data using built-in editing tools. For example, a GIS point representing a bridge can include one or many photographs of the bridge or a vegetation plot may GIS point may include an embedded photograph of a “witness tree”. Photographs deployed in this manner, however, must be resized as to not negatively impact client performance.

Image Dissemination

Images can be disseminated in a variety of manners.

- NPS Data Store— Images associated with a protocol database may be disseminated using the photograph reference type. The protocol database reference and protocol photographs reference can then be associated with each other by utilizing the 'project' reference type or the 'cross-references' functionality.
- Flickr—NPS has a service-wide agreement with Flickr and can use this platform to disseminate photographs to the public and also to make the photos available to other web-based applications. Flickr produces a unique URL for each image which allows images to be exposed in webpages such as an ArcGIS Online story map. End users interested in the use of Flickr should consult with the Data Manager. More information on proper Flickr usage can be found here: <https://sites.google.com/a/nps.gov/web-community/resources/socialmedia/flickr>

Roles and Responsibilities

Roles	Responsibilities
Data Manager	Aid Protocol Lead in designing and implementing image management solution for each protocol
	Disseminate data photos where appropriate
	Aid Protocol Lead in writing image management section of the protocol
GIS Specialist	Manage embedding of photographs in GIS Feature Classes
Protocol Lead	Notify Data Manager of any protocols involving data images
	Work with Data Manager to design and implement image management strategy for each protocol
	Work with Data Manager to write image management section of protocol

Acronyms and Definitions

Exif- Exchangeable image file format is a standard that specifies the formats for images, sound, and ancillary tags used by digital cameras, scanners and other systems handling image and sound files recorded by digital cameras.

IPTC- International Press Telecommunications Council developed a file structure and set of metadata attributes that can be applied to text, images and other media types.

Contact Information

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