

Southeast Coast Network

National Park Service
Inventory & Monitoring Program



Standard Operating Procedure (SOP) #2.1.7.

Digital Photo Management – Acquisition to Archiving (version 2.0)

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Summary

The management of digital assets has become a task of increasing importance as the prevalence of these materials has increased rapidly over time. As the Southeast Coast Inventory and Monitoring Network has moved from the inventory stage into monitoring, not only have the different categories of digital data expanded, but the amount of data being collected (and therefore needing preservation) has increased as well.

This SOP provides instructions for management of digital photographs, focusing upon handling the data, once it has been collected – describing how to preserve originals, handle editing and the preservation of original and final data and library files. This document does not describe the rationale for how or why the data were collected in the first place, as that information is included in the individual long-term monitoring protocols (and therefore outside the scope of this document). Nor is this document intended to be a cheat sheet or user guide in software-specific tasks and applications. Rather this document provides instructions on following digital photo and photo metadata standards to help ensure digital photos will be properly acquired, managed, preserved and made available, throughout their useful life.

Revision Log

Previous Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #
1.0	10/2/2012	C.J. Wright	Updated NPS photo standards; workflow changed to reflect current information management systems; roles and responsibilities assigned; naming convention updated; publication standards added.	Previous content was out of date.	2.0

Overview

The SECN digital photo management standard operating procedure serves to guide Network staff in the organization, management and preservation of digital photographs (including those scanned to digital). Where applicable, Federal and National Park Service standards will be discussed in conjunction with the asset being discussed (e.g. digital photographs and the NPS Digital Photo Metadata Standard).

Expected Audience

This SOP is written specifically for data management staff, protocol project leader and project crew members and cooperating partners who collect digital photographs and are responsible for their organization, use, documentation and preservation.

- Data management staff will want to read the entire SOP and be familiar with all aspects of the document. Data managers should be looking for ways to improve the system, but must first understand the system being used.
- Project leaders are responsible for understanding and fulfilling the data stewardship tasks, as well as ensuring that anyone under their supervision understands and fulfills their assigned responsibilities. Data stewardship roles and responsibilities can be found in Chapter 2 of the SECN Information Management Plan.

Digital Photograph Management

Introduction

The Inventory and Monitoring Program is tasked with organizing and maintaining a variety of research information, including digital images collected as data and images taken to document protocols and procedures. Concurrently, there is a growing need to make NPS digital photos useful and available service-wide. In support of these goals, this document describes a management strategy to organize, store, name, retrieve and preserve photographs in electronic format. The intent is to centralize processing and storage, reduce wasted disk space and to make photos available to NPS employees, partners and the public (whenever possible).

Terms and Definitions

- **Digital Photo:** refers to a photo in electronic format, regardless of how it was acquired, by scanning or from a digital camera.
- **Photo Processing:** is used in this document to refer to the sum total of all steps necessary to go from a photo on your camera's storage card to the photo library.
- **Documented Photos:** refer to photos that have completed metadata.

Photos are taken and used by NPS personnel for a variety of purposes. While it is impossible to anticipate every use/collection scenario, most photos from the Inventory and Monitoring Program should fit into one of the general "photo type" categories defined below:

- **Library Photos:** These photos are final products that have been edited, documented, reviewed and added to the parks and/or NPS digital photo library. Metadata for these photos is stored in the photo header in order to travel with the photograph. These photos can be used for multiple purposes by a variety of staff. They are generally in the public domain.
- **Working photos:** Photos in this category are "works in progress". Working photos should be edited (as needed), documented and moved into the photo library or they should be deleted. Metadata for working photos does not exist but is in progress. Working photos are stored in centrally located, protocol-specific folders adjacent to the photo library.
- **Data Photos:** Data photos are photos collected as data. Examples include: 1) site specific photos documenting a shoreline classification and, 2) photo points taken to document a site. Data photos are collected as part of a well-defined data collection protocol. Data photos are stored in the protocol-specific folder structure. Links to data photos may also be stored in the protocol database module, if appropriate. Representative, unique and/or instructive data photos can be added to the digital photo library.
- **Aerial Photos:** Aerial photos are an important element of inventory and monitoring datasets and are acquired and processed to meet highly specific specifications. Therefore,

digital aerial photos standards are mentioned in this document but are discussed in greater detail in the standard operating procedure on managing GIS data.

Digital Photograph Lifecycle

The “digital photo cycle” typically runs through the following steps. Photos are acquired, stored, viewed, renamed, edited, documented, stored in a photo library, archived and, in some cases deleted. Some of the issues and questions which crop up along the cycle include:

- Acquisition
 - Digital cameras – What is the best quality and size?
 - Scanning images – What parameters to use?
- Processing
 - Download and Storage – Where? For how long? Naming standards?
 - Viewing – With which software? Or as contact sheets?
 - Renaming – Manually or batch? Naming standards?
 - Editing – Which software? Should you write over the master or make a copy?
 - Documenting – Which attributes should be documented? How is the documentation ‘attached’ to the photo?
- Long-term Storage
 - On-line storage – Where? Managed by whom? For how long?
 - Off-line storage and archiving– Where and when? When to delete?

This document will attempt to address these questions and provide NPS standards or logical guidelines to facilitate good photo management. This document discusses imaging standards and how digital photos will be stored in a repository, documented and cataloged. Figure 1 summarizes the general photo management process and workflow.

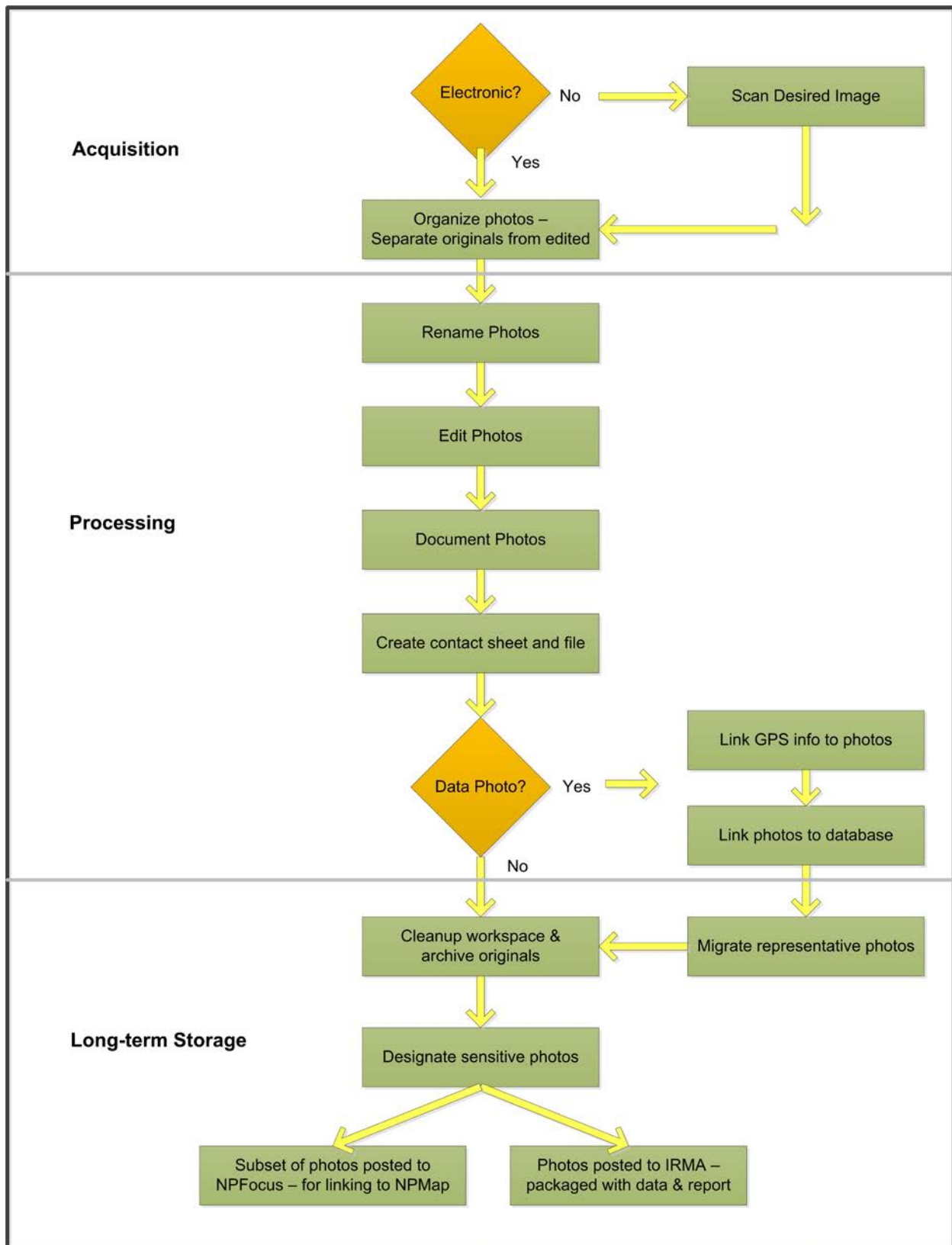


Figure 1. Digital Photograph Lifecycle

Roles and Responsibilities

Data stewardship is the responsibility of the entire SECN staff, from the field crews who collect, verify and enter data, to the protocol leads who validate, analyze and summarize the data, to the Network Data Manager and Database Programmer who ensure that master data sets are of high quality and that proper data management standards and practices are followed. General roles and responsibilities of key personnel are described below in Table 1.

Table 1. Digital photograph management roles and responsibilities for core personnel.

Position	Roles & Responsibilities
SECN Protocol Lead	Develops protocols/sets standards for photos taken in support of individual long-term monitoring protocols; ensures photos taken meet protocol standards and follow stated procedures; designates photos to be used in mapping application; ensures sensitive photos and/or metadata information (e.g. location information) are not being posted to online repositories;
SECN Field Crew	Takes / scans photos following standards and procedures set forth in the protocol; Saves original photos to a network drive that is backed up and sets the directory to Read-only; makes a copy of the originals – placed in a working directory for editing; renames photos; edits photos as described below; generates photo metadata and embeds metadata into photo header; organizes photos for upload into NPS Focus and IRMA – in a location accessible by the SECN Data Manager; copies original photos onto appropriate media and sends to SECN data manager for creation of archive; removes original and final photos from networked drive upon receipt of archive;
Park Staff	Provides feedback on any questions regarding the sensitivity of photos or photo metadata (e.g. location data) PRIOR to posting any data to online repositories.
SECN Data Manager (or designate)	Creates IRMA and/or NPS Focus records for photographs; uploads photos or sends photos to NRPC for uploading to the record; works with NPMMap to link photos to web mapping services; creates linkages in IRMA to tie photos to data, reports and protocol; creates archive of final photos using appropriate storage media – keeping one archive and returning the other copy to the appropriate SECN office; tests archives annually to ensure files are still accessible; migrates data to new formats as needed to preserve data over time
SECN Database Programmer	Technical point of contact for all tasks concerning database, application development and database administration; supports the linking of data photos within the SECN data management system as needed.

Digital Photo Acquisition Standards

Camera Settings

Individual long-term monitoring protocols should define the resolution requirements for digital photographs being taken in support of the protocol – for both data photos (e.g. photo points) and protocol-specific library photos (e.g. site photos, plant or animal photos etc.). When a pre-determined resolution is not stated, digital cameras should be set at a resolution appropriate for the highest level use to which a photo may be used. For example, publication quality photos should be taken at a minimum of 5 megapixels. If the camera will allow, the resolution should be set at 1760 x 1168 or higher. Because the final destination of a photo may be unknown at the time it is taken, it is recommended all photos be taken with this resolution or for lower resolution cameras, the highest resolution possible.

Most digital cameras can digitally imprint the date and time onto the photo image. In general, we do NOT recommend using this feature. Date and time data are embedded in digital photo file headers by most digital cameras. If the image is being cataloged and documented it has value – imprinting the image reduces the image quality and hence the image value. In addition, digital camera internal clocks are subject to minor cumulative errors. Accurate camera date and time is important to maintain, it is recorded as the file creation date for each photo and for jpg formats it is embedded in the photo itself. It is best to frequently sync camera time to an active GPS or to the network time.

File format considerations for publication quality photos

“The file type produced by a digital camera is determined by the capability of the camera and the settings chosen by the photographer. The type of file significantly influences the quality possible in media production. All high-end cameras can make camera raw and JPEG file formats. Many also have DNG and TIFF file capability. Because data compression is inherent in JPEG files and it always results in the unrecoverable loss of information, JPEG files are not acceptable for quality reproduction. Adobe DNG files (preferred) or proprietary camera raw formats automatically provide the highest resolution and bit depth for the camera, with the most flexibility, and ultimately the highest possible quality for reproduction. If your camera does not make camera raw files it is not up to the task of making files for reproduction.” (NPS 2010)

For a detailed discussion of digital images for media production, please refer to <http://www.nps.gov/hfc/pdf/digital-image-guide-dec06.pdf> from Harper’s Ferry Center.

Scanning Settings

The scanning resolution is selected based on the size of the original image. The smaller the photo, slide, or other material, the higher the resolution should be used to acquire a detailed scan. Below are the minimum recommended scan resolutions for different formats. Higher resolution scans will yield better quality images but also result in larger file sizes.

Organization

Within a user’s workspace on a networked drive (or other drive that is regularly backed up – NOT your PC’s hard drive!), the following directory structure is recommended for storing photos. If nothing else, it is important that photo originals be maintained intact and stored separately from working/edited photos to prevent accidentally “ruining” a photo during editing and having no original to return to – or accidentally saving the only copy of a photo to a lower resolution, rendering it no longer acceptable for other uses.

\Protocol

 \Images

 \Originals – raw, downloaded photos. This is a read-only directory.

 \Working – photos that are being processed. This should be a short term directory.

 \Final –photos which have been processed: renamed, edited, etc.

Original Photos

Raw, unaltered photos should be carefully preserved in the \Originals photo archive. This original set of photos should be preserved - as is - and copies of raw photos moved to clearly named folders for review and editing (e.g. \Working). In addition, after downloading or scanning photos to the

\Originals directory, this directory should be set to “read-only” permissions to prevent inadvertent edits.

Working Photos: It is unlikely that a photo will go directly from the scanner or camera exit port to the final data repository where it will live forever. Photos need to be processed before they are ready to be used in a database or in the photo library. Photos being processed “working photos” should be stored within a user’s networked drive or drive that is backed up on a regular schedule (do NOT store and process your photos on your PC’s hard drive).

Note that the above directory structure applies to photos being processed. Once final, the working folder can be eliminated and the originals archived separately from the edited (final) documented photos which are migrated to the directory structure described below.

Data Photos: Photos taken as part of a protocol’s data collection procedure are data that need to be organized, documented and preserved in conjunction with all other protocol data. Protocol data photos should be organized and contained within the protocol data structure and supported by detailed standard operating procedures that define how and where photos are to be downloaded, edited and rolled up into final folder locations.

It is recommended photos not be stored or embedded directly within a database; instead links to data photos can be stored in the database, as appropriate. Data photos should also be packaged and stored in IRMA (the National Park Service’s Integrated Resource Management Application) to accompany the corresponding snapshot of the Network’s data and made available to NPS staff, partners and the public with the appropriate level of permissions for data access.

Library Photos: Library photos are public photos readily available to be used for a variety of purposes. High quality photos are encouraged where possible, but may also include lower resolution photos. Incidental or opportunistic photos taken by project personnel are not data photos and can be also be managed as photos stored in a Library Photo directory. These photos have been reviewed, processed, documented and ready to be stored in a digital photo repository (e.g. IRMA and/or NPS Focus).

Photo Processing Steps

Photo Naming Convention

When dealing with hundreds of photos, such as in the case of data photos, descriptive naming is neither practical nor useful and photo file names should either be retained as produced by the camera or batch renaming without descriptive components should be used. **In all cases, photo names should not use spaces or special characters.** The following section provides the SECN photo naming standards.

All photos should follow the convention described here when being named.

- Each name will have exactly 25 characters.
- Camera number should be the last 6 digits of the NPS property number (all cameras are required to have a property sticker – if the camera has no property number, you need to request one from Sharon Ransby at SERO). If a personal camera was used, enter ‘person’.
- Each file name will follow the format presented below:

PARK**MMDDYYYY****PH****NUMBER****OG###**

PARK - Four character park code of where picture or file was taken or created

MMDDYYYY - Date photo was taken or GPS file was created in month, day and year format. The data must be 8 characters long.

PH - Photographer Initials (if unknown put XX). The complete photographer's name will be provided in the photo metadata record.

NUMBER – Last six digits of the NPS Property Number (indicated below). If using a personal camera, please enter 'person' as the number.

Brand/Model:	Property #:	Serial #:
Pentax OptioWP	NP5000100202	
Olympus Stylus 790 SW	NP5000105396	
Pentax Optio W 60	NP5000105874	
Nikon Coolpix s8100		30312564
Nikon D100	NP5000080901	2069885
Canon Powershot D10	NP5000105857	8621203492
Personal Camera	Personal	NA

OG – Project code comprised of the following:

O - Office Code: this will indicate which office the person taking the pictures is working from (numbers [or letters] can be added later should the need arise).

0 = SERO office

1 = FOSU office

2 = CUIS office

3 = Athens office

G - General category: this is a numeric code from 1 to 7 symbolizing the general category the Protocol code falls into. Please categorize photos according to the predominant subject matter.

Category Number	Category Description
1	Flora
2	Fauna
3	Geophysical
4	Water
5	People/Meetings
6	Scenic
7	General

- A three digit sequential number used at the end of the file name to ensure unique names. Restart at 001 at the beginning of each day.

Image Viewing and Editing

Viewing: Thumbnails give a quick icon view of many photos so photos may be quickly selected visually. It is recommended that 1) a quick viewing software or database be used to look at thumbnails, captions, descriptions, dates and keywords, and where appropriate, 2) a contact sheet of these thumbnails be printed for quick reference.

Editing: At a minimum, photos should be edited as follows:

- Poor quality photos should be deleted, except where the subject is highly unique.
- Medium quality photos should be assessed against existing photos of the same subject in existing photo libraries at the Park or Network level. If the photos duplicate the subject with no enhancement of quality or perspective, the photo may not be worth saving and should be deleted.
- Photos should be rotated to portrait or landscape, as appropriate.
- Photos should be rotated to make the horizon level.
- Photos of people should have 'red eye' removed.
- Photos should be cropped to remove edge areas that grossly distract from the subject.

Large groups of photos acquired under sub-optimal exposure or lighting can be batch processed to enhance contrast or brightness. Batch processing can also be used to resize groups of photos for use on the web.

Image Documentation and Cataloging

Images must be documented and cataloged. Documentation, or metadata, provides the minimum information a user will need to appropriately use the photo. Cataloging provides a collective means for searching, finding, and retrieving photos.

National Park Service Digital Photo Metadata Standard

The National Park Service digital photo metadata standard specifies that seven metadata elements should be considered mandatory. These are the minimum elements required to discover, interpret and manage the image and are indicated below. Other elements are required or recommended metadata components by NPS information management systems (e.g. NPSFocus and IRMA) in order to develop a more complete metadata record.

- **Coverage/Place:** Geographic area of resource. Coordinates are sub-elements (**M**)
- **Date Created:** Date created (**M**)
- **Keywords:** Subject terms, either use Keywords or Subject (**M**)
- **Park Code:** NPS Unit Code (**M**)
- **Publisher:** Agency that supported the item being produced in its current form (**M**)
- **Rights/Access:** Restricted access or publicly available (**M**)
- **Title:** Descriptive title (**M**)

Metadata attributes should be embedded in the header of the photo so that the metadata travels with the photo – thus ensuring its availability to future users. The SECN is recommending GPS-Photo Link to embed metadata into digital photos. NPS GPS-Photo Link has been tailored to fully support the NPS Digital Photo Metadata Standard and prepare image files for upload and discovery using the forthcoming release of the NPS Focus GAME system. NPS GPS-Photo Link also allows users to apply metadata to multiple photos at once by using a GPS unit and/or an Excel spreadsheet to import/migrate data. For more detailed information, please refer to: Southeast Coast Network (SECN). 2013. Dataset and Metadata Publication. Southeast Coast Network Standard Operating Procedure NPS/SECN/SOP-2.1.8. National Park Service, Athens, Georgia (<https://irma.nps.gov/App/Reference/Profile/2197066>).

Long-term Storage

The amount of server space required to house digital photos has grown extensively over time. The current annual estimate of disk space required to house SECN long-term monitoring protocol photos is 34 GB (4 GB all water protocols; 2 GB for amphibian, bird and vegetation monitoring and 28 GB for saltmarsh monitoring). This does not include vegetation mapping (an inventory project) which is estimated to require 175-200 GB drive space for photographs. In addition, storage requirements are likely to increase over time due to the increase in file size as camera equipment is upgraded. In order to maintain adequate storage space over time:

- Original photos will need to be archived onto external media (e.g. archival DVD, flash drives, external hard drives), preserved and migrated to new storage media and formats over time
 - Upon completion of editing photos and the migration of those photos from the Working directory to the Final directory, original files may be archived to external media and removed from the networked drive.
 - The type of external media used for archiving will depend upon the size of the directory (directories) being archived.
 - Please store all files to be archived from 1 protocol's field season together so that files are not scattered in multiple places.
 - A minimum of two copies of the archive should be made, with one stored locally and another stored offsite.

- Each copy of the archive should be accessed annually to ensure that the files are still accessible and readable. At this time, it should also be determined if the file format is such that the files will need to be migrated to newer formats so that they do not become unusable. In addition, with any signs of wear the archive should be moved to new media.
 - A detailed discussion of the pros and cons of various digital storage media can be found at:
<http://www.nps.gov/history/museum/publications/conservoogram/22-05.pdf>
- Final (library) and data photos will need to be packaged and posted to the appropriate NPS data repositories (e.g. IRMA and NPS Focus) so that they remain accessible as well as properly secured and backed up.
 - At the completion of photo editing and metadata generation, protocol library and/or data photos will need to be packaged for posting to IRMA (all photos) and NPS Focus (photos to be linked to web mapping services).
 - Photos will likely be packaged by park (all photos from one park for one field season) in order to keep download sizes reasonable. Files can be zipped together for the maximum download speeds.
 - In IRMA, create a record for the photo collection – completing as much of the metadata as possible. Upload the zip file of photos to the IRMA record as a holding. If the file is too large for reasonable upload speeds, the files may be sent to Brent Frakes (or designate) to attach the photos to the appropriate records. These instructions must be included with the media sent to IRMA staff.
 - Remember: do NOT post sensitive photos or information to the general collection of photos in IRMA which will be available publicly.
 - Through the use of Collections in IRMA, link the photo record to the protocol, the annual data summary report and the data records.
 - Once the Photos are posted in IRMA they can be removed from the networked drive. If the files are too large to be easily downloaded from IRMA it may be helpful to keep a copy of the files on storage media locally.

Publication Considerations

Photograph Property and Use

All photos collected with the National Park Service funds and staff time are property of NPS. Contractors using photographs as part of their project should provide copies, preferably high resolution digital copies, to the NPS project manager.

When using a photograph, provide credit to the photographer. This is usually written on the right side of the photograph or at the bottom in a smaller font size (e.g. san serif) than the text in the document.

Photographs of People and Rights to Privacy

When taking a photo of a person, the subject's right to privacy may come into play. Photos with the following criteria should seek a model waiver form:

- The person is recognizable, AND
- The person is not a government employee (on-duty), AND
- The photo will be used for profit to the photographer.

OR

- Any photos of a minor, where the minor is recognizable.

A National Park Service Release Form (<http://www.nps.gov/hfc/pdf/release-form-sep12-2008.pdf>) is used for private persons to authorize the NPS to publish an image that may contain their recognizable face.

Reference Documents

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