

Southeast Coast Network

National Park Service
Inventory and Monitoring Division



Standard Operating Procedure 1.1.05

Plot Photo Points—Version 2.1

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Summary

This standard operating procedure (SOP) provides instruction for photographing plots. Digital photographs will be archived and used as visual reference for change in vegetation appearance of plots over time. Photographs are taken immediately following plot setup to minimize the visual effect of field crew impact.

The datasheets used for this SOP include *SECN Veg Form 1—Vegetation Plot Establishment* and *Veg Form 3—Plot Photo Points and Canopy Closure Measures*. Samples of these forms are included in Appendix A of this SOP.

Revision Log

Revision Date	Author	Changes Made	Reason for Change	New Version #
3/01/2019	F. Boyle	Multiple	New SOP methods for new PIP, previous methods no longer applicable	2.0
3/29/2024	F. Boyle	Multiple	Minor clarifications for field procedures and an update to photo file metadata process	2.1

Contents

	Page
SOP Source and How it was Modified	3
Data Collection Procedures	3
Data Management	5
Image Metadata.....	6
Equipment List	8
Literature Cited.....	9
Appendix A: Field Data Forms.....	10

SOP Source and How it was Modified

This SOP is an adaptation of SOP 4 *Plot Photo points—Version 1.3* of the *Cumberland Piedmont Network Vegetation Monitoring Protocol* (White et al. 2011). For a general explanation of how the Southeast Coast Network modified the Cumberland Piedmont Network (CUPN) protocol and its SOPs, see *Terrestrial Vegetation Monitoring in Southeast Coast Network Parks: Protocol Implementation Plan* (Boyle et al. 2019). The Southeast Coast Network made one specific modification to the CUPN SOP by adding a third photo point location in the plot center using a 360° camera.

Data Collection Procedures

1. Set the point and shoot camera's resolution to 1760×1168 , or if using a lower resolution camera, to the highest resolution possible. This is the standard recommendation for all SECN digital images (SECN 2017). Do not set the camera function to digitally imprint the date and time onto the photo; however, make sure the date and time settings are accurate so they are stored as digital image file properties. Images are saved in the Joint Photographic Experts Group (JPEG) file format.
2. On the datasheet (*SECN Veg Form 3—Plot Photo Points and Canopy Closure Measures*), record the Plot ID, Start Date, Photographer Initials, and names of the cameras being used (make and model).
3. Take a photograph of the datasheet with the point and shoot camera.
4. Standing at the center western edge of the plot, take a photo using the point and shoot camera pointing due east (i.e., looking back into the plot; Figure 1). Make sure the camera is set to 'landscape mode' (or the equivalent) to obtain maximum coverage of all vegetation layers. **Do not zoom in on the scene.** The photo is taken from this point facing toward plot center and the photo is shot as if one were aiming to center the photo on the head of an average-sized person 20 meters (65.6 feet [ft]) away (i.e., photo will follow the slope in which it is pointed at eye level). When remeasuring a plot, the photograph is taken from the same location used when setting up the plot, even if the view from the standard location is no longer obstructed.
5. After a picture is taken, check the quality on the camera's LCD screen. The photograph is reviewed by a second crew member. Take an additional photograph(s) if the quality is questionable. Make sure the date/time stamp function is reporting accurately. If the view is blocked by a large tree or other obstruction, move as many paces to the north or south of the center edge until the obstruction is not in the viewshed.
6. Record the location of the photograph location on the plot diagram located in *SECN Veg Form 1—Vegetation Plot Establishment*; and other photograph information on *SECN Veg Form 3—Plot Photo Points and Canopy Closure Measures*.

7. Repeat Steps 3–6 at the center eastern edge of the plot, taking a photo pointing due west (Figure 1). In the event of an obstruction, move one pace to the right (north).
8. Set up the 360° camera on a leveled tripod (1.37 meters [4.5 ft] from the ground) placed at plot center. Turn the camera on, and wait until the camera has acquired satellites so the date and time stamp of the image will be correct. The camera has acquired satellites when the Saturn-shaped icon on the screen stops blinking. Set the initial view due north/south and record the scene. Turn the camera around 90 degrees so that the view is pointing east/west; record that scene.
9. Record the location of the 360° photographs' locations on the plot diagram located in *SECN Veg Form 1—Vegetation Plot Establishment*; and other photograph information on *SECN Veg Form 3—Plot Photo Points and Canopy Closure Measures*.

Once all photos have been taken and reviewed, the reviewer initials the datasheet.

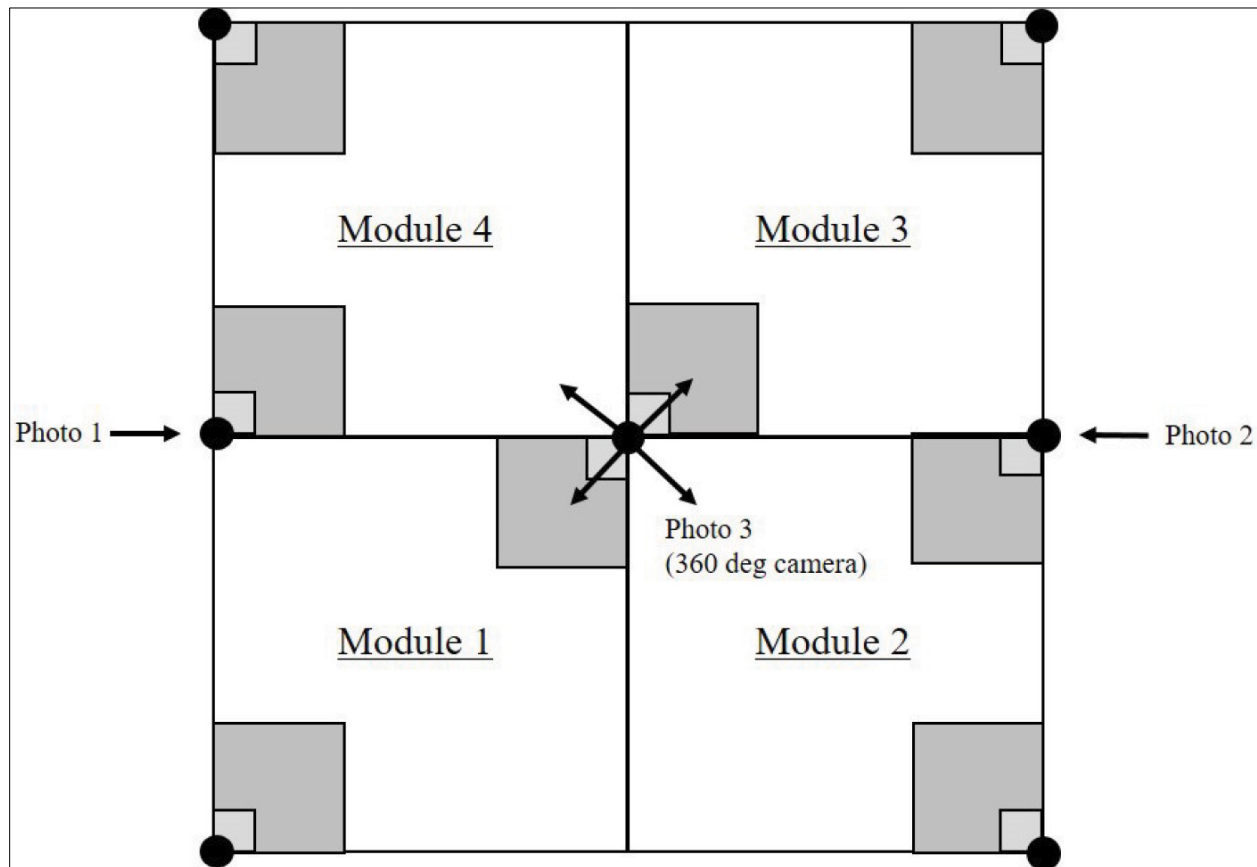


Figure 1. An example of a plot diagram (*Southeast Coast Network Veg Form 1: Vegetation Plot Establishment*) illustrating plot photo point location information. The solid circles represent the location the photographer was standing and arrows represent the direction the photograph was taken.

Data Management

After field work is complete for the day, download the photos to a field laptop and a backup location. When the field crew has access to the internet, transfer digital records to the SECN Vegetation Monitoring \Photopoints\Raw folder on the Share Drive. These are the digital images in an unaltered form. Make sure this directory is set to “read-only” permissions to prevent inadvertent edits to the original file.

Images need to be processed before they are ready to be stored long-term or used. Images actively processed are working images and should be stored within an image directory on a networked drive—i.e., **not** stored and processed on a PC’s hard drive. Raw images are copied and pasted into the SECN vegetation monitoring plot photos folder at:

S:\Monitoring\VegetationCommunities\Data\<Year>\<Park>\Photopoints\<Park Subunit Name> on the Share Drive. Some of these images will not be useful due to improper exposure, or alternatively, they may be bad versions of better images taken to document the same data need. Any bad image is deleted. All other images are renamed in their otherwise original form. Renamed data images are kept in the appropriate protocol-specific image or image directory. Saving image files to a new file format (if converting from JPEG to PNG for example) will also occur in this step. In some cases, renamed images may require editing to make them useful for specific purposes. They may be edited by cropping the image or altering the image resolution from the original state. Edited images must be denoted as such within the file name to differentiate them from the renamed original file. All renamed and edited images must then be documented. Once appropriate file property information or image metadata is applied to each image file, the images are then fully documented and are considered final.

Final images are packaged and stored in the NPS Integrated Resource Management Applications (IRMA) data store as part of the SECN vegetation monitoring annual reporting requirements.

Once all working images have been fully processed, including appropriate documentation, and double-checked by the protocol lead as part of data quality control, the working files may be deleted. The final images can then be archived in the SECN Vegetation Monitoring \Photopoints\Archive folder on the Share Drive. Photographs follow the naming convention of <plot id>_<date>_<VegetationMonitoring>_<direction>.jpg where the date is YYYYMMDD and the direction is either E or W (or NE, NW, SE, or SW if the photo direction was changed due to some obstruction), or 360. For example: CUIS06_20200607_VegetationMonitoring_E. Any non-data images (non-photo points) are named following this convention: <plot id, or Park (if photo not taken on a vegetation plot)>_<date>_BriefTitle>_<###>, where the date is YYYYMMDD, and ### is a three-digit sequential number used to ensure a unique file name.

Image Metadata

The SECN digital photo metadata standard specifies seven mandatory metadata elements. These are intended to be the minimum elements required to discover, interpret and manage images. This standard is a helpful guide but there is currently not an image viewing or editing software that fully meets the NPS standard. The Southeast Coast Network utilizes the mandatory elements from the NPS standards, where those elements are applicable.

Image metadata are stored along with the image file itself in the file properties, (or “file header”) wherever possible. The following list represents the minimum required image metadata to ensure image files are usable over time.

All images include:

- Date Created—date image was created.
- Title—a shorthand reference for the image or “photograph”—primarily for identification. The title of an image should be a short, human-readable name.
- Author—the first and last names of the person who created the image. If it is not appropriate to add the name of the photographer (for example, the photographer’s identity needs to be protected) use a company or organization name. Once saved, this field should not be changed.
- Subject—one word or compound word that helps to group images into primary categories.
- Keywords (also known as Tags)—Describes topics or themes of the content of the image; used to express greater detail on the subject of the image; may be free text and do not come from a controlled vocabulary; may be topics, proper names of places, events, places, or visual descriptions of the image. The keyword primarily describes a theme or topic used to facilitate discovery (searching) and classification of the image.
- Park Code—four letter park acronym.
- Comments—relevant notes pertaining to the image, including summary of image contents and significance.
- Access Constraints—Identifies whether access is restricted or image is publicly available. This is used to indicate sensitive or non-sensitive image status.
- Contact Info.
- Coordinate X.
- Coordinate Y.
- Protocol Citation.

Additionally, the following information is added to each photo file (by right clicking the file>Properties>Details tab):

- Description/Title: “Photopoint (direction <west> or <east>) of <plot ID>, Year <Sampling iteration>, Year
 - E.g. Photopoint (direction west) of CALO002, Year 1, 2022
- Description/Subject: “Southeast Coast Network Vegetation Monitoring Photopoints”
- Description/Tags: “"Vegetation Monitoring", "Photopoints", "<Park Name>", "Plot Photo"
- Origin/Authors: “<Protocol Lead Name>”
- Origin/Copyright: “Public Domain”

Equipment List

- Relatively high-quality camera with installed SD card
- 360° camera with installed SD card
- Pencil
- Field datasheets (SECN *Veg Form 1—Vegetation Plot Establishment* and *Veg Form 3—Plot Photo Points and Canopy Closure Measures*). Datasheet field descriptions for Form 3 are detailed in Table 1.

Table 1. Datasheet field descriptions for *Veg Form 3—Plot Photopoints*.

Field Name	Field Description
Photographer Initials	Record initials of photographer.
Reviewed by	Initials of individual who reviewed completed data sheet for SOP VEG03 elements. Ideally this should be someone other than individual who completed this portion of datasheet.
Cameras	Text name of cameras and/or make/model of cameras used (e.g., Nikon Coolpix S6100).
Mark Photopoint	Is the photo point location, number and direction clearly marked on plot diagram (Veg Form 1): Yes or No.
Datasheet Photo	Was a photo of the datasheet (designating photographer, date, plot id, photo point number and direction) taken with camera before taking plot photo?
Photo Notes	Include photo name (file name) from camera. Will likely be a generic number such as sd001, etc. Also, include other notes about photo point such as whether moved from standard position, etc.
Other Photo Notes	To be used if other photos documenting something related to plot were taken. This may include additional reference photos to aid future teams in realigning plot or photos of potential forest pest evidence.

Literature Cited

- Boyle, M. F., M. B. Gregory, M. W. Byrne, P. I. Capece, and S. Corbett. 2019. Terrestrial vegetation monitoring in Southeast Coast Network parks: Protocol implementation plan. Natural Resource Report NPS/SECN/NRR—2019/1930. National Park Service, Fort Collins, Colorado. Available at: <https://irma.nps.gov/DataStore/Reference/Profile/2263392> (last accessed June 2024).
- Southeast Coast Network (SECN). 2017. Digital image management—Version 3.1. Standard Operating Procedure NPS/SECN/SOP—2.1.07. Southeast Coast Network, Athens, Georgia. Available at: <https://irma.nps.gov/DataStore/Reference/Profile/2243092> (last accessed June 2024).
- White, R., C. Nordman, L. Smart, T. Leibfreid, B. Moore, R. Smyth, and T. Govus. 2011. Vegetation monitoring protocol for the Cumberland Piedmont Network, Version 1. Natural Resource Report NPS/CUPN/NRR—2011/XXX. National Park Service. Fort Collins, Colorado. Available at: <https://irma.nps.gov/DataStore/DownloadFile/515620> (last accessed June 2024).

Appendix A: Field Data Forms

SECN Vegetation Monitoring Protocol Veg Form 1 – Vegetation Plot Establishment		Plot ID _____ (plot acronym + GRTS Order #)	Start Date _____ (mm/dd/yy)
SOP VEG02 – Site Selection, Plot Establishment, and Return Visits			
Reviewed by: _____		Park _____ Unit _____ GRTS Order _____ QA/QC Plot Yes or No Start _____	
Time _____ Total Time _____		Crew _____ (circle crew leader)	
GPS file name _____ GPS model _____ GPS Unit ID _____			
Field UTM X _____ m E Field UTM Y _____ m N NAD 83 Zone 16 17 18 (circle one)			
# times averaged _____ GPS error _____ Elevation: _____ m WAAS enabled Yes or No			
Directions to plot (Be specific, including where parked, landmarks used, if any gate keys needed, etc.) _____ _____ _____ _____ _____			
Approximate Travel Time from Vehicle to Plot _____ minutes			
Permanent Plot Established (circle one) Yes or No (if no, provide justification below) _____ _____			
Compass Declination _____ ° (SECN parks range from 4 - 11°)			
Tag 1 Tag # _____ Tag Color _____		Tag 2 Tag # _____ Tag Color _____	
Tag Tree Species _____		Tag Tree Species _____	
DBH of Tag Tree _____ cm		DBH of Tag Tree _____ cm	
Direction Tag is facing (0-360°) _____		Direction Tag is facing (0-360°) _____	
Direction from Tag Tree 1 to Plot Center (0-360°) _____		Direction from Tag Tree 2 to Plot Center (0-360°) _____	
Distance From Tag Tree 1 to Plot Center _____ (m)		Distance From Tag Tree 2 to Plot Center _____ (m)	
office use only (print initials and mm/dd/yy)			
Form Validated By _____ Form Entered By _____ Form Modified By _____			
Reason for Modification _____			
Data Verified By _____ Data Validated By _____ Certified Date _____			

SECN_Vegetation_Monitoring_Protocol
 Data_Form_20190306

Figure A-1. Sample Veg Form 1, page 1 of 2.

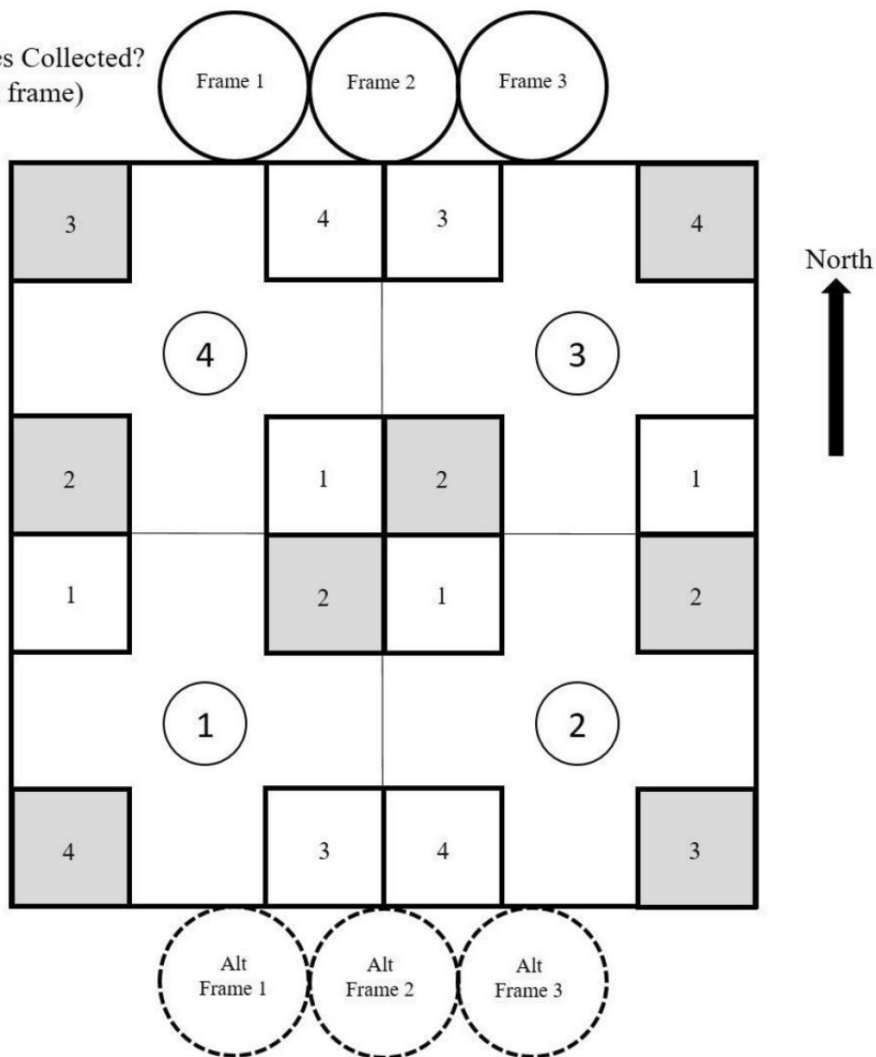
SECN Vegetation Monitoring Protocol
Veg Form 1– Vegetation Plot Establishment

Plot ID _____
(plot acronym + GRTS Order #)

Start Date _____
(mm/dd/yy)

Plot Layout Notes (Unusual plot features, irregularities, or was plot moved?) _____

Soil Samples Collected?
(check each frame)



SECN_Vegetation_Monitoring_Protocol
Data_Form_20190306

Figure A-2. Sample Veg Form 1, page 2 of 2.

SECN Vegetation Monitoring Protocol Plot ID _____ Start Date _____
 Veg Form 3- Plot Photopoints and Canopy Closure (plot acronym+ GRTS Order#) (mm/dd/yy)

SOP VEG03 - Plot Photopoints	Photographer Initials	Reviewed by:
Cameras: text name of cameras or make/model of camera _____		
Photopoint (E and W) - Mark photopoints location and direction on plot diagram(pg 2)		Yes or No
Photo of datasheet taken before taking plot photo (with Plot ID, Date, Photo pt#, and Direction?)		Yes or No
Photo notes (record photo file name from camera): _____ _____		
Photopoint (Center) - Mark photopoint location and direction on plot diagram(pg 2)		Yes or No
Photo of datasheet taken before taking plot photo (with Plot ID, Date, Photo pt#, and Direction?)		Yes or No
Photo notes (record photo file name from camera): _____		
Add other photo notes in case there are other photos taken in plot: _____		

SOP VEG 04 - Canopy Closure Data taker initials _____ Reviewed by: _____

Stand Height _____ m

Module	Direction	Spherical Densiometer tally of shaded dots (0-96)
1	N	
1	E	
1	S	
1	W	
2	N	
2	E	
2	S	
2	W	
3	N	
3	E	
3	S	
3	W	
4	N	
4	E	
4	S	
4	W	

Module	Alternative Quick Estimate of% Canopy Cover*
1	
2	
3	
4	

Average % Canopy Cover: _____

* "Quick method should only be used in rare circumstances with explanation noted below

Cover Notes (if any): _____

Note: It is only necessary in the field to collect the tally of "shaded" dots in canopy; the remaining calculations can be done at the time of data entry (the table is provided for convenience). For forests, it is easiest to count the number of dots that are not shaded (sky is showing through canopy opening) and then subtract that number from 96 to obtain the number of "shaded" dots.

Figure A-3. Sample Veg Form 3.