Southeast Coast Network

National Park Service
Inventory and Monitoring Division

Standard Operating Procedure 1.4.07

Field Season Preparation—Version 1.2

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Summary

This standard operating procedure (SOP) describes the preparations necessary for the summer field season and includes a list of necessary field equipment. Preparations are completed by the start of the field season in late April or early May. Staff must review the protocol by March of each year and revise any sections of the protocol narrative (Boyle et al. 2019) or associated SOPs based on lessons learned from the previous year.

Revision Log

Revision Date	Author	Changes Made	Reason for Change	New Version #
March 2020	M.F. Boyle	Minor changes made to the "Quality Control Plot Preparation" section, allowing for the protocol lead to select plots for 'quality control.'	The protocol lead, in addition to the program manager, should have the ability to select which plots to double count and thus use as 'quality control' because of their coordination of the overall sample effort.	1.1
March 29, 2024	F. Boyle	Minor clarifications to "Maps and GPS" section, and updates to Table 1 (supplies and equipment checklist).	Clarification	1.2

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SOP Source and How It Was Modified

This SOP is an adaptation of *SOP1 Field Season Preparation—Version 1.2* of the *Vegetation Monitoring Protocol for the Cumberland Piedmont Network* (White et al. 2011). For a general explanation of how the Southeast Coast Network (SECN) modified the Cumberland Piedmont Network (CUPN) protocol and its SOPs, see the protocol implementation plan document (Boyle et al. 2019). For this specific SOP, the Southeast Coast Network made only minor editorial modifications to CUPN *SOP 1* and added or removed a few items from the equipment list, to meet SECN-specific needs. Also, the Southeast Coast Network utilizes a single field crew of NPS staff during the first year of protocol implementation, while the Cumberland Piedmont Network utilizes two field crews and relies on cooperators for staffing.

Staffing

The protocol implementation plan (Boyle et al. 2019) will be implemented during its first year by one field crew of two members, with one member possessing good plant identification skills and the ability to conduct sampling methods (the protocol lead). Additional skills should include knowledge of exotic plants, forest pests, pathogens, and soils. This protocol requires the use of cameras, GPS units, compasses, clinometers, and other field tools (see equipment list below, Table 1). All members of the crew must be trained in basic plant identification and vouchering techniques. Following the first year of implementation, an additional field crew of two members will be brought on to assist with field sampling. The team leader of this crew should possess good identification skills of plants in the Piedmont and Coastal Plain of the Southeastern United States. If resources are available, three-person teams will be utilized.

To secure NPS field personnel, the network must advertise on USAJobs, but may also advertise at local universities and listservs such as the Ecological Society of America's listserv (ecolog-l@listserv.umd.edu). Network staff may also find it useful to connect with regional environmental professors and professionals to identify skilled seasonal staff.

Soon after they are hired, each crew member is sent a welcome packet via mail or email to help them prepare for the field season. Welcome packets contain information about the SECN Inventory and Monitoring program, safety guidelines, suggestions on personal gear to bring for the season, instructions for ordering field gear, a schedule for the field season, and park-specific information, including lists of common species in each park.

Planning and Coordination

Network personnel must ensure park personnel are fully informed on the locations and marking practices used for this protocol, at least one month before any plots are established at the park. The primary contact person is the park's natural resource manager, who must receive a current version of the protocol (including SOPs) as well as a map of proposed plot locations, a digital list of GPS coordinates, and an expected sampling schedule for the park visit.

Specific feedback is required for the plot marking, tree tagging, and soil sampling procedures. If park personnel have issues with the planned procedures, the network can vary the materials used to mark plots or trees and determine an alternative approach to soil sampling. The park's natural resources manager or cultural resource specialist must also approve of plot marking and soil sampling practices for all plot locations (from a map and GPS coordinates). Finally, prior to any revisits to the park, the resource manager must be informed of any updates or changes to the protocol or SOP, be sent a new map of plot locations, and receive the plot-level schedule for that visit.

A day prior to sampling or at the start of the first field day, field crews should stop by the park office for brief introductions and to meet any logistical needs such as picking up keys and hang tags. Park staff or interns may be interested in this project, and should be encouraged to join crews for at least one plot to learn more about vegetation monitoring.

Transportation and Lodging

The protocol lead reserves an SECN field vehicle (4WD pickup or SUV) for travel to, from, and within parks. All vehicle operators are required to have taken and received credit, prior to the field season, for the National Safety Council's Defensive Driving Course. Additionally, boats are reserved prior to sampling in parks that require access to plots via a waterway (e.g., Congaree National Park). Boat operators are required to have completed the Motorboat Operator Certification Course (MOCC; SAF4102), and taken the MOCC Refresher (SAF4R02-OLT) for re-certification every five years. See SOP 3.1.01 *Reporting of On-duty Injury and Illness—Version 4.1* (Corbett and Smrekar 2017) for more information.

When scheduling a sampling visit, the network asks park staff about the availability of park lodging and makes reservations at the park when possible. If no park lodging is available, lodging is reserved near the park, at least one month in advance of the visit. Wherever possible, lodging should include access to kitchen facilities and internet. Lodging space must be sufficient to comfortably accommodate all crew members and their gear.

Scheduling the Field Season

When setting the sampling schedule for a given field season, the protocol lead must consider both the cross-year and within-year sampling order of parks and plots. For the cross-year order, the Southeast Coast Network's 15 parks are divided into four panels (three to four parks/year):

- Panel 1 (First sample year: 2019)—Cape Hatteras National Seashore (CAHA), Fort Matanzas National Monument (FOMA), Fort Pulaski National Monument (FOPU), and Timucuan Ecological and Historic Preserve (TIMU).

- Panel 2 (First sample year: 2020)—Chattahoochee River National Recreation Area (CHAT), Cumberland Island National Seashore (CUIS), Fort Sumter National Monument (FOSU), and Ocmulgee National Monument (OCMU).

- Panel 3 (First sample year: 2021)—Congaree National Park (CONG), Fort Frederica National Monument (FOFR), and Kennesaw National Battlefield Park (KEMO).
- Panel 4 (First sample year: 2022)—Canaveral National Seashore (CANA), Cape Lookout National Seashore (CALO), Horseshoe Bend National Military Park (HOBE), and Moores Creek National Battlefield (MOCR).

For the within-year sampling order, a given plot must always be sampled within two weeks of the original sample date, in order to reduce the confounding of seasonal variation with annual variation. As a result, parks typically are revisited in a consistent order over time. This order is set by the order of events during the first field season for each group of parks.

The SECN vegetation monitoring protocol lead communicates daily with other field crew members to see how the protocol implementation is progressing (e.g., what field techniques are working well, any issues with network to park communication). The SECN program manager and vegetation monitoring protocol lead hold a mid-season meeting with the field crew to discuss the crew's progress and any concerns that have surfaced. This meeting takes place after the first round of QA/QC sampling has occurred.

Maps and GPS

Prior to each field season, network personnel prepare both GIS maps and aerial photographs showing that year's sampling locations for each park at scales of 1:24,000 or larger. Maps must clearly show location of all plots in relation to topography, roads, trails and park features. Line and point symbols for roads, streams, plots and other features must be clearly visible but not large enough to obscure other features. Scale bars must show miles in addition to kilometers, to aid navigation by car. Also, overlaying a Universal Transverse Mercator (UTM) grid on a printed map along the outer margins is very helpful for field navigation when used with a GPS unit set to the UTM coordinate system. If possible, smaller locator maps should be included on large scale maps. These maps and aerial photographs are printed on Rite-in-the-Rain paper using a color LaserJet printer. Note that inkjet printing does not properly adhere to Rite-in-the-Rain paper. A full set of maps for each park are provided to the field crew prior to sampling.

The crew must also be supplied with road maps for the region surrounding each park visited. Coordinates of each plot are exported, printed, and downloaded directly into the network GPS unit. Trails, park boundaries, and topographic maps are also loaded on GPS units.

When establishing the plots for the first time, maps are sent at least one month in advance of field work to key park staff and these staff are asked if they see any problems with the location of any new plots that the team plans on establishing for that field season. If any plots are clearly on a large road, managed old field, building, or pond, they are replaced by the next point not already assigned for sampling on the list of points (see discussion about this in main report [Boyle et al. 2019] and SOP 1.4.10 [Boyle 2020]) for specifics on criteria for replacing plots). However, if there is doubt as to whether the point is in one of these areas or not, then the point will be kept and field crews will

decide whether to keep it or replace it during their first visit to the site. When planning for plot revisits, maps will contain established plot locations from the plot establishment year as well as two to three alternate plots in case an established plot must be removed from the sampling array due to safety issues, changes of broad habitat type (e.g., high marsh becomes open water), or other unforeseen circumstances.

Using DNR Garmin or similar software, network personnel will upload plot coordinates into the SECN GPS unit(s) or handheld device (see SECN SOP 1.4.10 *Site Selection, Plot Establishment, and Return Visits—Version 1.1* [Boyle 2020] and the DNR Garmin website). Immediately after uploading the plot coordinates, check the GPS map page to ensure the plot locations are shown correctly and are in the correct projection. One easy way to check that the points are loaded properly is to navigate manually to the park in the GPS's map function and see if the points line up approximately with where they should be based on landmarks such as highways and towns. Although not perfect, this method will help field crews avoid gross projection errors that may place the plot locations in a different state or hemisphere. During plot revisits, coordinates from the established plots will be compared to the original plot coordinates to check for errors in GPS reception or user error.

Quality Control Plot Preparation

Each year, roughly 5% of the plots in the Southeast Coast Network will be selected for "quality control" repeat visits to ensure consistency in data collection across the network. This will occur at parks that are scheduled for sampling within a given year. Plots scheduled for repeat visits will be selected randomly prior to the sampling event at a given park when two or more field crews are scheduled for work during the entire sampling event, or on an ad hoc basis when two field crews are not scheduled to work during the entire event. In the former situation, the network program manager or protocol lead will randomly select from a single park where multiple field crews are working those 5% of "quality control" plots among the total amount of plots to be sampled within a given year.

Field crews measuring the plots will not be informed as to which plots were chosen. Instead, a separate field crew will be asked to go back and resample the plot within two weeks of the first team's sample. The list of resampled plots will be given to the network program manager, so logistics can be arranged separately from the regular plot work and so the field crew that measured the plot originally does not know it is one of the quality-control points. When two field crews are not scheduled to work at a single park for its entire sampling event, "quality control" plots will be chosen by the protocol lead based on the timing of when two teams overlap at a given park and the plot order in the overall sampling schedule. Two field crews may collect data simultaneously from a given "quality control" plot, assuming there is no communication between the two teams. In rare events, when only one field crew is available for sampling during the entire field season, then the tasks they perform must be different from the initial sampling visit and the "quality control" revisit (e.g., data recorder becomes the person who measures). In this case, at least four other plots should be sampled between a plot's original sampling visit and its "quality control" revisit.

Training

Prior to commencement of each field season, the network must ensure all field personnel fully understand administrative responsibilities and field procedures by conducting in-situ trainingsessions. Field crew training should begin in early May and occur over a three-day period at a SECN park scheduled for vegetation monitoring during the field season. The location of the initial training session is determined by network staff.

Prior to the training session, a copy of the protocol implementation plan and current SOPs is sent to all participants. Other materials that should be sent include:

- Full vascular plant species list for parks to be sampled that field season (available via NPSpecies)
- Ecological community type key for parks to be sampled that field season
- Invasive Species Early Detection list for the Southeast Coast Network
- Plot navigation 'cheatsheets'
- Datasheets
- Park contact list

Training includes both demonstration of all measurements by trainers, and hands-on practice of all measurements by trainees. All trainees must have sufficient opportunity to practice measurements thoroughly and question the trainer as needed. If crew members are involved in data entry, then training must also thoroughly demonstrate how to enter data into the database. Training covers the following topics:

- Safety and workers' compensation information, including
    - Procedures for checking in with park and network staff (including instructions for park radio use)
    - Weather issues (storms and heat)
    - Challenging driving scenarios, including backcountry or heavy tourist areas
    - Decision-making on when to abandon a plot based on safety concerns
    - Safe field practices to avoid injury, such as how to properly pack and wear a field pack and work in areas with poison ivy, venomous snakes, and biting or stinging insects
- Protection of park natural and cultural resources

    - Emphasis on the critical importance of careful plot behavior to minimize plot trampling (e.g., in wetlands or areas with thick herbaceous cover, crew members place and unload packs outside the plot boundary; plans should be made ahead to retrieve all necessary gear once rather than taking multiple trips across the plot; extra care to avoid trampling in nested subplots
    - Precautions to avoid damage to park cultural resources and artifacts that may be encountered within or en route to plots.
- Overview of field methods
    - Review of common plants within each park
    - Proper use of equipment, including GPS, digital cameras, compass, clinometer, canopy densiometer, and diameter tape
    - Methods for efficiently setting up a plot with two and three crew members
    - Methods for tree tagging and mapping
    - Use and layouts of plot datasheets and ecological community type keys
    - Methods for collecting and labeling specimens
    - Procedures for collecting soil in the field and office/lab procedures
    - Practice estimating percent cover
    - Identification of specific tree condition and foliage problems

Training must emphasize the critical importance of careful, accurate and steady data collection to this long-term monitoring program. Trainers must stress the importance of exact adherence to SOP instructions to prevent bias in measurements among years, which will inhibit the network's ability to detect long-term trends. Trainees are encouraged to discuss with network supervisors any concerns that arise over field procedures or the datasheet or database recording systems during training or later during the field season—the crew must not deviate from established protocols or alter the datasheet or database without first taking this step.

Communication

Field crews carry a programmed inReach device at all times during field work. When appropriate or required by park policy, crews carry a NPS radio when working in remote areas of parks. Radios are programmed to the appropriate frequencies for each park. Crew members must know which frequencies to use, how to contact park radio dispatch, and be familiar with proper radio etiquette. In parks with cell phone coverage, crew members will be encouraged to carry a cell phone in the field for safety and to call the protocol lead concerning protocol questions, although this is not required. It is essential for the crew to maintain regular contact with SECN staff throughout the field season.

Establish a regular weekly telephone call time between each team leader and supervisors to review the week's work. The update should cover questions or problems related to plots, protocol, logistics, and scheduling. The SECN program manager and any other supervisors should try to join field teams at least once during the field season to directly observe data collection procedures.

Additionally, an Itinerary Form outlining dates of field work, contact arrangement within a park, and a detailed sampling schedule including coordinates of plot locations to visit is sent to parks several weeks before sampling. For parks that include plots that are accessed via watercraft, a float plan is also included in the Itinerary Form.

Contracts

If soil samples are anticipated to be taken in a particular year, the Southeast Coast Network will select an experienced forest soils chemistry laboratory, and have a purchase order or other contract in place for soil sample analysis, ideally prior to soil sample collection. Several soil laboratories have sufficient capabilities and have capacity to quickly analyze samples, including the labs used by the Carolina Vegetation Survey (Brookside Labs in New Knoxville, Ohio). The protocol lead will make a final decision about the lab to be used to analyze samples during the summer of each year.

The project manager will work with the SECN program manager to establish necessary contracts for bringing on additional field crew members as needed.

Supplies and Equipment

Required equipment and supplies for vegetation monitoring are listed in Table 1. Equipment must be organized and maintained in good working order. Mark each piece of equipment with a piece of brightly colored flagging tape or duct tape to assist with locating it in the field during data collection. At the end of each season, the crew leader will inventory the condition of all equipment and prepare a list of required repairs or replacements. Order any new supplies required for work by February.

Table 1. SECN seasonal vegetation monitoring supplies and equipment checklist.

Type	Contents	Source	Check
Master Binder (per field crew/season)	List of park contacts (with phone numbers), park UTM zones, and declinations	In-house	□
	Park permits	In-house	□
	Paper list of all plots to be visited along with UTM coordinates	In-house	□
	Paper copies of maps illustrating all selected and alternate plot locations, overlaid on both USGS topographical and aerial image backgrounds; roads, trails, and park boundaries should be included	In-house	□
	Park maps/brochures with roads and trails, if available	In-house	□
	Master plant list for each park	In-house	□
	Key to the ecological communities of each park	In-house	□
	Laminated sheets with tree data definitions, tree DBH, tree health condition codes, technique for measuring stand height, and a sample diagram of a typical plot with information on the nested subplots	In-house	□
	Paper list of Invasive Species Early Detection for each park	In-house	□
	SECN emergency contact information sheet and directions to hospital for each park	In-house	□
Field Datasheets (per season)	Plot Establishment Years: Set of 150 blank field datasheets on Rite in the Rain paper	In-house	□
	Resample Years: Set of semi-populated field datasheets of plots to be resampled that year (from database) on Rite in the Rain paper	In-house	□
Field Equipment for Plot Establishment (per season)	12” long rebar (seven per plot)	Florida Level & Transit	□
	Nylon sheaths or pillowcases (for transporting rebar in the field)	Walmart	□
	Orange permanent plastic surveyors markers (rebar covers; seven per plot), labeled by subplot and corner	Florida Level & Transit	□
	Hammer w/ prongs	Lowes	□
	Round numbered aluminum tree tags (#1-1000)	Forestry Suppliers	□
	Wood siding sinker head style aluminum nails	Forestry Suppliers	□
Field Equipment for Plot Resample	Magnetic Locator	Schonstedt	□
	12” long rebar (two per plot, for replacing missing rebar)	Florida Level & Transit	□

Type	Contents	Source	Check
(per field crew/season)	Orange permanent plastic surveyors markers (rebar covers; seven per plot), labeled by subplot and corner, replacements)	Florida Level & Transit	□
	Hammer w/ prongs	Lowes	□
	Round numbered aluminum tree tags (#1-1000)	Forestry Suppliers	□
	Wood siding sinker head style aluminum nails	Forestry Suppliers	□
Field Measurements (per field crew/season)	GPS (two)	Garmin	□
	Spare batteries, 12 four-pack	Forestry Suppliers	□
	Enclosed clipboards (two)	Forestry Suppliers	□
	Pencils (many)	Forestry Suppliers	□
	Compass (two)	Forestry Suppliers	□
	Open reel fiberglass tape, 30 meter (six)	Forestry Suppliers	□
	Chaining pins, set of 11 plus Chaining Pin Quiver (one)	Forestry Suppliers	□
	Flagging tape (qty 24)	Forestry Suppliers	□
	Wire stake flags, bundle	Forestry Suppliers	□
	Spherical densiometer, concave (two)	Forestry Suppliers	□
	Diameter tape, metric, fabric (two) + mini D-tape (two)	Forestry Suppliers	□
	Wooden meter sticks (four)	Forestry Suppliers	□
	Hand pruners (two)	Forestry Suppliers	□
	Plastic bags for plant and soil samples, 2.5 gallon (20)	Associated Bag Company	□
	Compact binoculars (two)	Forestry Suppliers	□
	Soil knife / digging tool (aka, ninja death tool)	Forestry Suppliers	□
	Sealable gallon-sized plastic bags (x 200)	Associated Bag Company	□
	Black industrial ‘Sharpie’ markers for soil samples (x 4)	Forestry Suppliers	□
	Digital camera	Amazon	□
	360° digital camera	Garmin	□
	Waterproof camera bags	Amazon	□

Type	Contents	Source	Check
	Clinometer, percent + degree markings	Forestry Suppliers	□
	Backpack, ~2,000 cubic inches (x 2)	REI	□
Safety/ Personal Gear (per crew member, unless otherwise noted)	inReach device + annual contract (one per field crew)	REI	□
	First Aid Kit (one per field crew)	Forestry Suppliers	□
	Insect Repellent	Forestry Suppliers	□
	Sunscreen	Forestry Suppliers	□
	Tech-nu poison ivy soap	Forestry Suppliers	□
	Hip waders	Forestry Suppliers	□
	Knee boots	Forestry Suppliers	□
	Hand lens + lanyard	Herbarium Supply Company	□
	Snake boots or chaps	Forestry Suppliers	□
Field Office Supplies (per field crew/season)	Plant press, white driers, ventilators, and newsprint	Herbarium Supply Company	□
	Plant field guides and floras	In-house	□
	Spare batteries	Forestry Suppliers	□
	Dissecting microscope	In-house	□
	Laptop for downloading photos and data entry	In-house	□
	Portable filing cabinet and hanging folders	Amazon	□
	Paper clips	Amazon	□
	Document scanner	In-house	□

Review of Annual Staff Roles

Staff roles and when each task should be implemented during the year are presented in Table 2.

Table 2. List of SECN vegetation monitoring protocol tasks, responsible staff, and schedule.

Task	Staff	Timing
Finalize field schedule for crews	protocol lead	January–February
Reserve park housing (where opportunity exists) or non-park housing for field crews	protocol lead	February
Establish and refine annual and seasonal budgets	protocol lead and network program manager	February
Acquire the appropriate permits	protocol lead	February
Hire seasonal field crew	protocol lead, bio-tech, and network program manager	February
Communicate with park staff in order to (a) review selected and alternate plot locations, (b) schedule/confirm plot sampling dates, and (c) arrange assistance from park personnel in transportation, logistics, field sampling, etc.	protocol lead, bio-tech	February
Prepare, repair, and purchase equipment	bio-tech	March
Confirm with parks the appropriate method for monumenting plots (i.e., is it okay to mark plots with conduit?) and tagging trees (i.e., is it okay to mark trees with aluminum tags/nails?)	protocol lead	March
Reserve program or park vehicles, boats	protocol lead	March
Randomly select 5% of plots for QA/QC data collection	network data manager	March
Identify who will be taking QA/QC data for that year	protocol lead and network program manager	March
Prepare database and datasheets for the field season (review species list and add crew member names)	protocol lead and bio-tech	April
Compile training and field packets that include maps of all plots, coordinates, species lists, and datasheets	protocol lead and bio-tech	April
Coordinate directly with park resource managers when conducting field work in each park; call at least two weeks in advance to confirm field work dates and send completed Itinerary Form	protocol lead and other botanist (field crew leader)	April–August
Conduct training	protocol lead	April–May
Participate in field season and oversee field crew during sampling, providing logistic and administrative support, and ensure plot work meets quality standards	protocol lead and other botanist (field crew leader)	May–September

Task	Staff	Timing
Ensure effective communication is occurring between park staff, field crew, and other SECN staff	protocol lead and other botanist (field crew leader)	May–September
Enter all data into master database as soon as practical once data are taken	protocol lead, other botanist (field crew leader), bio-tech and crew members	May–October
All unknown plants collected during the field season are identified to the highest taxonomic level as possible	Protocol lead, other botanist (field crew leader)	October
Ensure soil samples are post-processed (oven dried) and shipped to soil lab	bio-tech	November
Review and revise monitoring protocol and SOPs	protocol lead	November
Conduct data verification on 10% of the datasheets once they are entered into the database	protocol lead (network data manager if the protocol lead was on the field crew)	November
Conduct data validation after records are entered in the database	protocol lead	November
Compare data between original and QAQC plots	protocol lead	November
Data analysis and report writing	protocol lead	November–January
Submit summary reports	protocol lead	January

Literature Cited

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