

Standard Operating Procedure 1.4.17

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This standard operating procedure (SOP) details the field procedures for the accuracy assessment (AA) of the Southeast Coast Network’s vegetation mapping inventory program. This SOP was written specifically for use at Cape Lookout and Cape Hatteras National Seashores, but methods are generally applicable to parks across the Southeastern US.

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Overview

This standard operating procedure details the field procedures for the accuracy assessment (AA) of the Southeast Coast Network's vegetation mapping inventory program. The primary purpose of accuracy assessment (AA) field work is to supply data that will test the accuracy of vegetation maps. The main uses of AA data are:

- Verify accuracy of polygons drawn on the map (map units)
- Verify relationships between associations and mapping units
- Verify that field key works well to classify vegetation to the association
- Check for classification completeness, i.e. associations not sampled and described during inventory
- Clarify concepts and augment descriptions of existing associations and possibly develop new associations

Equipment

- GPS receiver
- Compass
- Digital camera
- Aerial photographs or maps of Accuracy Assessment sites
- Stakes or flagging
- Measuring tape: 50-meter (164-feet [ft])
- First aid supplies
- Field forms
- Mechanical pencil
- Clip board
- Soil probe
- Field guides and keys
- Soil guide
- National Vegetation Classification System (NVCS) reference

Procedure

Field Methods

Random points for the accuracy assessment (AA; obtained by methodology outlined in Lea and Curtis 2010) will be generated prior to the AA field work by the remote sensing specialist. The remote sensing specialist will provide the field observers with these points. Prior to field work, the AA field observers should upload the GPS points into the GPS receiver. The field observers should note that the AA points are in polygons that are considered natural or semi-natural vegetation as defined by the National Vegetation Classification Standard (NVCS; FGDC 2008). Cultural vegetation and non-vegetated areas are not sampled with AA points. Points for the accuracy assessment are restricted to inside the park boundaries and are not located in any of the buffered area outside of park boundaries.

Once in the field, field crews will navigate to each selected AA point using the handheld GPS receiver and map(s) consisting of the aerial imagery as a base overlaid with the AA point locations (vegetation polygons as delineated by the remote sensing specialist will not be included on these maps). The observer will simultaneously watch the GPS screen and walk when navigating to points. The observer should plan their approach route to the site to anticipate travel difficulties (i.e. thick brush, water bodies, or drop-offs). The most direct route indicated by the GPS unit is not the safest or the easiest to traverse.

As with all field work, navigation will likely occur through rough terrain, often off-trail, to reach the destination. In AA work, you want to reach as many points as possible in a day, and to get as close to each point as feasible. Use good judgment. Safety is paramount in all situations. Alternate points will be provided in case an AA point cannot be reached due to difficult terrain or other reasons (more on this in the subsequent section). If this happens, please document that the point was not reachable.

Field crews should use the GPS receiver to locate an AA point to within 3 meters (9.8 ft) of the UTM coordinate (if possible) but should not spend excessive time trying to get within 3 meters, since an area around each AA point will be evaluated that corresponds to the minimum mapping unit (MMU). The MMU set by the National Park Service Vegetation Mapping Inventory is 0.5 hectare, or 5,000 square meters (m^2). However, photo-interpreters can choose to delineate to smaller polygons if the map class is distinctive on the imagery. For Cape Hatteras NS and Cape Lookout NS, the over-all project MMU was set at 0.5 hectare but some classes were mapped at a smaller size due to their distinctiveness on the imagery. Typically, the AA plot will be circular in shape (radius = 28 meters [91.9 ft]), however, in some situations the plot shape will need to be varied (e.g. 50×50 meters [164 $\times$ 164 ft] square or 25×100 meters [82 $\times$ 328 ft] rectangle) to accommodate the map unit being sampled (e.g. a long-narrow riparian area). The MMU determined for each AA observation is embedded in the plot name for each AA point. For example, CAHA-AA-050-001 indicates that the MMU for CAHA plot 001 is 0.5 hectares (5,000 m^2). A plot with a MMU of 0.5 hectares has an observation area with a radius length of 40 meters (131.2 ft). Table 1 provides guidance for what the values embedded in each AA plot name represents, as well as what observation radius size should be used for each AA point, based on its MMU.

Table 1. Meaning of values embedded in each AA plot name along with corresponding observation area radius lengths [MMU—minimum mapping unit].

Value embedded in plot name	Observation Area Size, based on MMU	Observation Area Radius Length
- 01 -	0.1 hectare (1,000 m ²)	18 meters (59 ft)
- 025-	0.25 hectare (2,500 m ²)	28 meters (91.9 ft)
- 050 -	0.50 hectare (5,000 m ²)	40 meters (131.2 ft)

If the AA point falls at the edge of a polygon in an ecotonal area, the observer should record data for the two community types represented above and below the ecotone. The observer should first determine where the plant community becomes distinct and where it can be classified using the Vegetation Association Key, and should navigate to that point. The observer should also record the distance and direction from the original AA point that the observations were made. A GPS waypoint should be recorded for each of the new observation areas. The observer should then complete species lists for the two distinct communities outside of the polygon edge or ecotone area. Notes should be made regarding the reason for the deviation from the original AA point (e.g. “the location of the original AA point occupied an ecotonal area”). The observation area will remain the same at the relocated points as were stated in the point name (e. g. -01-, -025-, or -050-).

If the site itself proves unsafe or impossible to approach (as determined by the observer), it may be possible to record the nearest position and direction and distance to the site (offset) and still observe the prescribed observation area around the site adequately enough to make a field call (often this occurs if the type is relatively distinct or otherwise easily keyed). If the original observation area cannot be adequately observed from this alternate position, the alternate position may be recorded and the alternate observation area around the position may be observed (Lea and Curtis 2010).

Upon arrival to the plot center (site coordinates or offset site coordinates), the observer should immediately mark it with a stake or flagging. Packs or other materials not needed for the accuracy assessment can be left in the center of the plot. The observer should take a GPS waypoint from this plot center, making sure that the GPS receiver is set to the appropriate datum (NAD83). When collecting a waypoint, the GPS receiver should be placed on the ground for a minimum of 10 minutes prior to creating a waypoint. This allows the GPS to average the satellite data to derive at the best averaged position. Photographs used for site documentation will also be taken from the plot center (when possible).

AA Point Form Instructions

This section documents field instruction for AA point data collection and serves as guidance for completing the AA Form (see Appendix A).

Location Data

Record the AA Point Code on the form, which is derived from the park abbreviation, a unique identifier that represents the observation area size, and a three-digit number (e.g. CAHA-025-001). The full name of the park being sampled, the date, and the field observer's initials, plus the initials of any other observers, should also be recorded. The number of photographs taken at each AA point should be recorded. (At least four photographs in each cardinal direction should be taken, which is described in further detail in a subsequent section). The GPS unit used (e.g. Garmin GPSMAP 62st), the projection and map datum, and Easting and Northing coordinates should be recorded. The estimated accuracy of the GPS unit at the time of navigation should be recorded as well as the number of satellites.

Environmental or Site Description

The observer should enter comments on the environmental setting and its effect on the vegetation, as applicable. Examples include: "stunted trees due to shallow soils" or "inundated forest; hydrologic indicators present." This field can also be used to describe site history such as fire events or other disturbances that may have impacted the area. Other information such as elevation, slope, aspect, topographic position, geology, the composition of unvegetated surfaces, and hydrology can be included as relevant. Including this information is up to the discretion of the observer, if it is important to the site characteristics and vegetation at each site.

Soil Characteristics

Using a soil probe, collect a sample from the plot center point. Collect the sample by pushing the probe into the ground. Withdraw the probe, and using a knife, slice along the probes open side, creating a clean soil profile. Do not discard the slice, set aside. Measure the length of the O-horizon and A-horizon. Document on the field form. Remove the A-horizon from your slice and follow the Simplified Key to Soil Texture below (Brewer and McCann 1982) to determine soil texture. Document your findings on the field form. and Figures 1 and 2 will help to determine soil horizon and to describe soil characteristics. See Appendix B for additional assistance.

Simplified Key to Soil Texture (Brewer and McCann 1982)

Place about three teaspoons of soil in the palm of your hand. Take out any particles less than 2 millimeters in size, and use the following key to figure out the soil texture (e.g., loamy sand). Then figure out the texture subclass by using the Code List attached (e.g., coarse loamy sand).

- A1 Soil does not remain in a ball when squeezed.....sand
- A2 Soil remains in a ball when squeezed B
- B1 Add a small amount of water. Squeeze the ball between your thumb and forefinger, attempting to make a ribbon that you push up over your finger. Soil makes no ribbon loamy sand
- B2 Soil makes a ribbon; may be very short C
- C1 Ribbon extends less than 1 inch before breaking D
- C2 Ribbon extends 1 inch or more before breaking E
- D1 Add excess water to small amount of soil; soil feels very gritty or at least slightly gritty
..... loam or sandy loam
- D2 Soil feels smooth..... silt loam
- E1 Soil makes a ribbon that breaks when 1–2 inches long; cracks if bent into a ring.....F
- E2 Soil makes a ribbon more than 2 inches long; does not crack when bent into a ring..... G
- F1 Add excess water to small amount of soil; soil feels very gritty or at least slightly gritty
..... sandy clay loam or clay loam
- F2 Soil feels smooth..... silty clay loam or silt
- G1 Add excess water to a small amount of soil; soil feels very gritty or at least slightly gritty
..... sandy clay or clay
- G2 Soil feels smooth..... silty clay

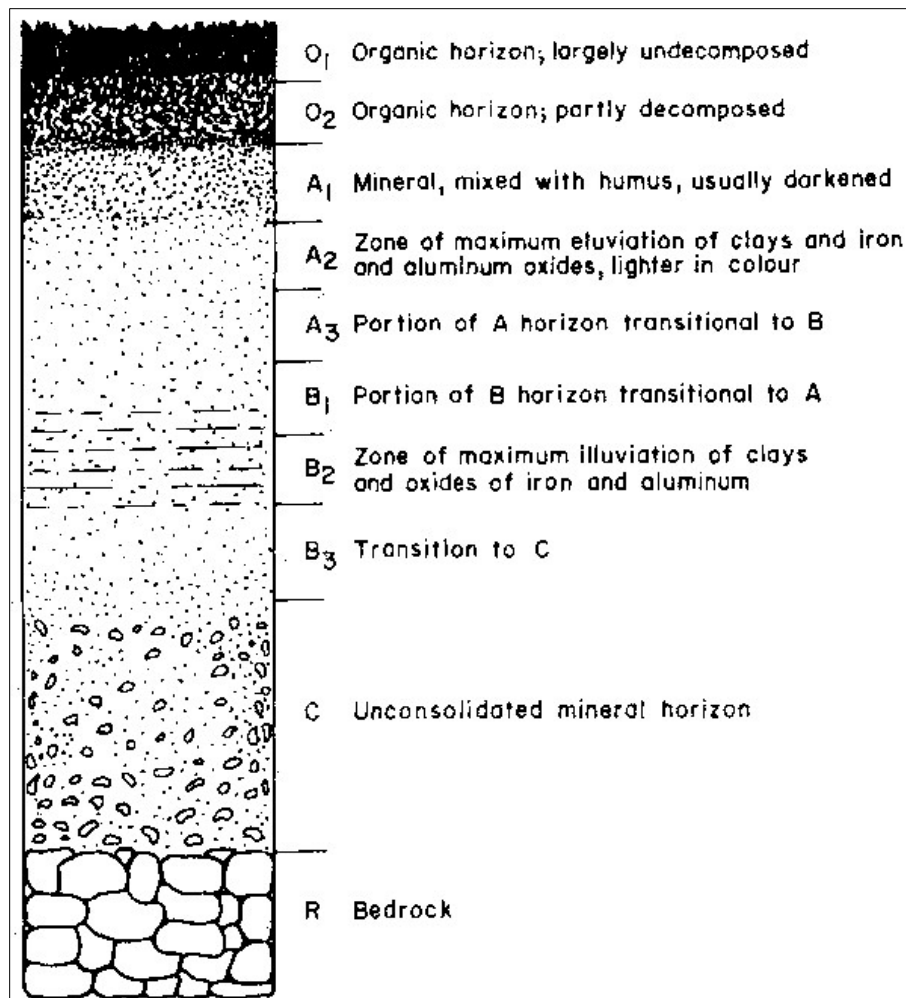


Figure 1. Diagram showing soil layers.

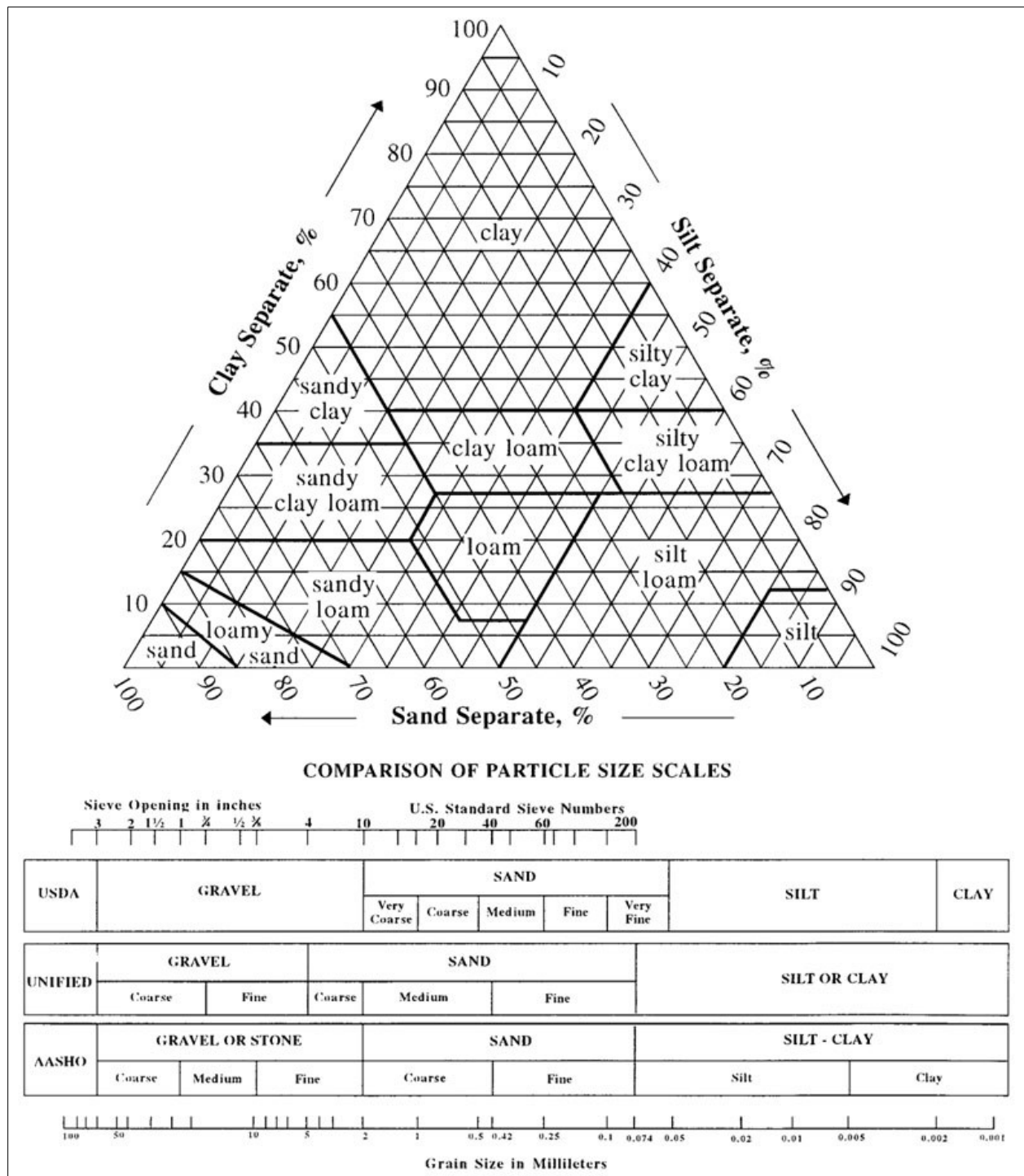


Figure 2. Soil texture classification diagram modified from Schoeneberger et al. (2012) with USDA, unified, and AASHTO scales for assessing soil particle sizes.

Vegetation Description

Leaf Phenology:

Select the best description for the leaf phenology of the **dominant** stratum. The dominant stratum is the tallest stratum that contains at least 10% cover. Leave blank for non-vascular plant-dominated AA points.

- Evergreen—Greater than 75% of the total woody cover is never without green foliage.
- Cold deciduous—Greater than 75% of the total woody cover sheds its foliage in connection with an unfavorable season mainly characterized by winter frost).
- Mixed evergreen—Cold deciduous: Evergreen and deciduous species are mixed within the type and generally contribute 25–75% of the total woody cover.
- Perennial—Herbaceous vegetation composed of more than 50% perennial species.
- Annual—Herbaceous vegetation composed of more than 50% annual species.

Leaf Type:

Select the best description for the leaf form of the **dominant** stratum. The dominant stratum is the uppermost stratum that contains at least 10% total coverage. Within that dominant stratum, the species that makes up greater than 50% of cover defines the leaf type.

- Broad-leaved—Woody vegetation that is primarily broad-leaved (e.g. oak).
- Needle-leaved—Woody vegetation that is primarily needle-leaved (e.g. juniper, pine).
- Microphyllous—Woody cover that is primarily microphyllous (e.g. *Ephedra*).
- Graminoid—Herbaceous vegetation composed of more than 50% graminoid species (e.g. grasses, sedges, rushes).
- Forb (broad-leaf-herbaceous)—Herbaceous vegetation composed of more than 50% broad-leaf forb species (e.g. *Salicornia*, *Borrchia*).
- Pteridophyte—Herbaceous vegetation composed of more than 50% ferns or fern allies (e.g. *Woodwardia*, *Osmunda*).
- Non-vascular—Dominated by lichens or mosses.
- Mixed—As with leaf phenology, the dominant stratum may be composed approximately equally of a species with several different leaf types. Describe the mix briefly or circle leaf types that apply.

Physiognomic Class:

Physiognomic class represents what is seen at the AA point when looking across the vegetation. The following definitions can be used as guidelines.

- Forest—Trees with their crowns overlapping (generally forming 60-100% cover).
- Woodland—Open stands of trees with crowns not usually touching (generally forming 10–60% cover). Canopy tree cover may be less than 10% in cases where it exceeds shrub, dwarf-shrub, herb, and non-vascular cover, respectively.
- Shrubland—Shrubs generally greater than 0.5 meters (1.6 ft) tall with individuals or clumps overlapping to not touching (generally forming more than 25% cover, trees generally less than 10% cover). Shrub cover may be less than 25% where it exceeds tree, dwarf-shrub, herb, and nonvascular cover, respectively. Vegetation composed of woody vines is included in this class.
- Dwarf-shrubland—Low-growing shrubs usually under 0.5 meters (1.6 ft) tall. Individuals or clumps overlapping to not touching (generally forming more than 25% cover, trees and tall shrubs generally less than 10% cover). Dwarf-shrub cover may be less than 25% where it exceeds tree, shrub, herb, and nonvascular cover, respectively.
- Herbaceous—Perennial or annual herbs (graminoids or forbs) dominant (generally forming at least 25% cover; trees, shrubs, and dwarf-shrubs generally with less than 10% cover). Herb cover may be less than 25% where it exceeds tree, shrub, dwarf-shrub, and non-vascular cover, and non-vascular cover, respectively.
- Nonvascular—Nonvascular cover (bryophytes, lichens, or algae) dominant (generally forming at least 25% cover). Nonvascular perennial vegetation cover may be less than 25%, as long as it exceeds tree, shrub, dwarf-shrub, and herb cover.

Vegetation Composition

Dominant species found at each AA site should be recorded in the list, and next to each species name, a check mark should be made to indicate its corresponding stratum.

Vegetation Association

1. Using the Vegetation Association Key developed for the park, the observer will key the vegetation within the observation area surrounding each AA point to the association that best fits. Field observers should be aware that even the best crafted field key cannot account for all vegetation variation encountered. Any key will trade some diagnostic accuracy for the sake of efficiency and repeatability. The observer should choose the association in the key that best fits. In addition to the key, the vegetation descriptions may be consulted in order to resolve ambiguous situations. If vegetation near the AA point does not key well, make the best effort to fit it into one or two of the associations listed in the key, then make detailed comments in the “Classification Comments” field. If the vegetation does not fit the Vegetation Association Key, create a new name using the dominant species of each stratum.

2. List any other vegetation associations present that were not listed above.
3. Representativeness of AA point. Because the AA points are randomly located within a polygon, there is no guarantee they will land in a spot representative of either the polygon or of the plant associations included within the polygon's map unit. The point could easily land in a small gully or an inclusion too small to map, or an ecotone where trees are invading a shrubland. It is important that the field observers pay attention not only to the vegetation within the sample area, but the larger area well. For the primary plant association call, please rank the representativeness of this AA point for the polygon (Good, Fair, Poor, or Unknown). Please note in the Classification Comments field if the AA point falls in an ecotone or inclusion, or in an anomalous situation such as in a gully or sandy area.

Classification Comments

Use this space to provide additional comments about problems or ease in applying the Vegetation Association Key at this site, rationale for choice of association, such if there was doubt in or trouble making the classification decision.

Photo Point Collection

Photographs of each AA site are to be collected at the time of the assessment in order to provide a visual documentation of each site. A photograph should be taken from the center (if possible) of the AA site in each cardinal direction (N, E, S, W), of the ground, and of the canopy (if applicable) (Figure 3). Field crews will take a picture of the field form, focusing on the plot name prior to taking plot photographs as a way of accurately keeping track of the photographs and their corresponding plot number.



Figure 3. Photographs of each AA site should be taken in each cardinal direction (N, E, S, W), of the ground, and of the canopy, if applicable. NPS photo.

Reporting

Proper communication between field crews and the remote sensing specialist is essential to a successful accuracy assessment. While working at Cape Hatteras National Seashore and Cape Lookout National Seashore, field crews should report daily for the first week of the field season and then weekly thereafter. Field crews should report at minimum the following information: date/time, site number, keyed association for site, GPS coordinates, and notes or comments associated with each site (see Figure 4). Field crews should call in the results for the daily reporting of the first week of the field season. For the weekly reporting, field crews may call in the results, email the results, or fax the results, depending on what is most convenient.

Cape Hatteras and Cape Lookout National Seashores Accuracy Assessment Reporting Form

[illegible]

Figure 4. Example of Accuracy Assessment Form.

Training

Prior to conducting any field work, field observers conducting the accuracy assessment will participate in a training session that covers loading points into the GPS, navigating with the GPS, use and maintenance of the UTVs, an overview of the classification and mapping effort, specific methodology for the accuracy assessment, and reporting criteria. During the training session, field observers will have the opportunity to “practice” sampling an AA site with project collaborators. By the end of the training session, field observers should be able to perform tasks independently and with minimal assistance from project collaborators. At the end of the training session, field observers should be able to:

- Estimate cover with reasonable accuracy and precision (repeatability)
- Accurately estimate the extent of the observation area (as defined by the minimum mapping unit size for the map class)
- Consistently identify situations that represent an overly heterogeneous field observation area
- Efficiently and safely navigate and travel off-trail in the terrain to be expected
- Identify all species named in the field key, as well as likely look-alikes
- Navigate with and use a GPS unit
- Characterize near surface soil conditions

As an aid to the field observers, a list of plant species likely to be encountered during the AA has been compiled (Table 2). This list represents a minimum of plant species that the field observers should be familiar with prior to conducting AA work.

Table 2. Common Species of Cape Hatteras National Seashore and Cape Lookout National Seashore.

Type	Scientific Name	Common Name
Trees	<i>Pinus taeda</i>	loblolly pine
	<i>Pinus elliotii</i>	slash pine
	<i>Pinus pinaster</i>	maritime pine
	<i>Quercus virginiana</i>	live oak
	<i>Quercus hemisphaerica</i>	Darlington oak / sand laurel oak
	<i>Quercus falcata</i>	southern red oak
	<i>Acer rubrum</i>	red maple
	<i>Cornus foemina</i>	stiff dogwood
	<i>Persea palustris</i>	swamp bay
	<i>Persea borbonia</i>	redbay
	<i>Magnolia virginiana</i>	sweetbay
	<i>Nyssa sylvatica</i>	blackgum
	<i>Prunus serotina</i> var. <i>serotina</i>	black cherry
Shrubs	<i>Juniperus virginiana</i> var. <i>silicicola</i>	southern red cedar
	<i>Carpinus caroliniana</i>	American hornbeam
	<i>Ilex opaca</i>	American holly
	<i>Ilex vomitoria</i>	yaupon
	<i>Morella cerifera</i>	wax myrtle
	<i>Baccharis halimifolia</i>	eastern baccharis
	<i>Baccharis angustifolia</i>	saltwater false willow
	<i>Iva frutescens</i>	Jesuit's bark
	<i>Iva imbricata</i>	seacoast marsh elder
Herbs/Forbs	<i>Vaccinium corymbosum</i>	southern highbush blueberry
	<i>Borrchia frutescens</i>	bushy seaside tansy
	<i>Hydrocotyle bonariensis</i>	largeleaf pennywort
	<i>Juncus roemerianus</i>	black needlerush
	<i>Juncus megacephalus</i>	bighead rush
	<i>Schizachyrium littorale</i>	shore little bluestem

Type	Scientific Name	Common Name
Herbs/Forbs	<i>Andropogon glomeratus</i>	bushy bluestem
	<i>Eragrostis spectabilis</i>	purple lovegrass
	<i>Gaillardia pulchella</i>	firewheel
	<i>Opuntia pusilla</i>	cockspur pricklypear
	<i>Spartina alterniflora</i>	saltmarsh cordgrass
	<i>Spartina patens</i>	saltmeadow cordgrass
	<i>Distichlis spicata</i>	inland saltgrass
	<i>Fimbristylis castanea</i>	chestnut fimbry
	<i>Schoenoplectus pungens</i>	common threesquare
	<i>Muhlenbergia filipes</i>	southern hairgrass
	<i>Eustachys petraea</i>	dune fingergrass
	<i>Cladium mariscus ssp. jamaicense</i>	sawgrass
	<i>Rhynchospora colorata</i>	starrush whitetop
	<i>Typha domingensis</i>	southern cattail
	<i>Setaria magna</i>	giant foxtail
	<i>Setaria parviflora</i>	marsh bristlegrass
	<i>Centella erecta</i>	erect centella
	<i>Phragmites australis</i>	common reed
	<i>Eremochloa ophioroides</i>	centipede grass
	<i>Stenotaphrum secundatum</i>	St. Augustine grass
	<i>Triplasis purpurea</i>	purple sandgrass
	<i>Uniola paniculata</i>	sea oats
	<i>Panicum amarum</i>	bitter panicgrass
	<i>Panicum virgatum</i>	switchgrass
	<i>Paspalum vaginatum</i>	seashore crowngrass
	<i>Ammophila breviligulata</i>	American beachgrass
	<i>Solidago sempervirens</i>	seashore goldenrod
	<i>Symphyotrichum tenuifolium</i>	saline aster
	<i>Limonium carolinianum</i>	sea-lavender

Type	Scientific Name	Common Name
	<i>Boehmeria cylindrica</i>	smallspike false nettle
	<i>Sarcocornia pacifica</i>	glasswort
	<i>Salicornia</i> sp.	saltwort sp.
	<i>Sesuvium portulacastrum</i>	shoreline sea-purslane
	<i>Cakile edentula</i>	sea-rocket
	<i>Oenothera humifusa</i>	seabeach evening- primrose
	<i>Chamaesyce bombensis</i>	dixie sandmat
Vines	<i>Toxicodendron radicans</i>	eastern poison ivy
	<i>Parthenocissus quinquefolia</i>	Virginia creeper
	<i>Ampelopsis arborea</i>	peppervine
	<i>Cynanchrum angustifolium</i>	gulf coast swallow-wort
	<i>Mikania scandens</i>	climbing hempvine
	<i>Vitis rotundifolia</i>	muscadine
	<i>Smilax auriculata</i>	earleaf greenbrier
	<i>Smilax bona-nox</i>	saw greenbrier
	<i>Smilax rotundifolia</i>	roundleaf greenbrier
	<i>Ipomoea sagittata</i>	saltmarsh morning-glory

Literature Cited

- Brewer, R., and M. McCann. 1982. Laboratory and Field Manual of Ecology 1982. Saunders College Publishing.
- Federal Geographic Data Committee (FGDC)-Vegetation Subcommittee. 2008. National Vegetation Classification Standard (Version 2). FGDC-STD-005-2008. Available at: https://www.fgdc.gov/standards/projects/FGDC-standards-projects/vegetation/NVCS_V2_FINAL_2008-02.pdf (last accessed August 2019).
- Lea, C. and A. C. Curtis. 2010. Thematic accuracy assessment procedures: National Park Service Vegetation Inventory, version 2.0. Natural Resource Report NPS/2010NRR—2010/204. National Park Service, Fort Collins, Colorado. Available at: https://www1.usgs.gov/vip/standards/NPSVI_Accuracy_Assessment_Guidelines_ver2.pdf (last accessed August 2019).
- Schoeneberger, P. J., D. A. Wysocki, E. C. Benham, and Soil Survey Staff. 2012. Field book for describing and sampling soils, Version 3.0. Natural Resources Conservation Service, National Soil Survey Center, Lincoln, Nebraska.

Appendix A. Accuracy Assessment Form

I. LOCATION DATA:

II. ENVIRONMENTAL/ SITE DESCRIPTION:

III. VEGETATION DESCRIPTION:

Physiognomic class

☐ Forest
☐ Woodland
☐ Shrubland
☐ Dwarf Shrubland
☐ Herbaceous
☐ Nonvascular
☐ Sparsely Vegetated

[illegible]

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1. Primary and secondary (if there is a close call or multiple associations within the same polygon) vegetation classification(s) within radius of observation point, based on field key:

3. Representativeness: Does the assigned association represent the vegetation well? If not, why? Please rank the fit as "Good" "Fair" or "Poor."

O-horizon depth: _____ A-horizon depth: _____

Soil texture (from key below): _____

(Simplified Key to Soil Texture (Brewer and McCann, 1982))

- | | | |
|----|--|-------------------------------------|
| A1 | Soil does not remain in a ball when squeezed | sand |
| A2 | Soil remains in a ball when squeezed..... | B |
| B1 | Squeeze the ball between your thumb and forefinger, attempting to make a ribbon that you push up over your finger. Soil makes no ribbon..... | loamy sand |
| B2 | Soil makes a ribbon, may be very short..... | C |
| C1 | Ribbon extends less than 1 inch before breaking..... | D |
| C2 | Ribbon extends 1 inch or more before breaking..... | E |
| D1 | Add excess water to small amount of soil; soil feels at least slightly gritty | loam or sandy loam |
| D2 | Soil feels smooth..... | silt loam |
| E1 | Soil makes a ribbon that breaks when 1-2 inches long; cracks if bent into a ring..... | G |
| E2 | Soil makes a ribbon 2+ inches long; doesn't crack when bent into a ring.... | F |
| F1 | Add excess water to a small amount of soil; soil feels at least slightly gritty..... | sandy clay loam or clay loam |
| F2 | Soil feels smooth..... | silty clay loam or silt |
| G1 | Add excess water to a small amount of soil; soil feels at least slightly gritty..... | sandy clay or clay |
| G2 | Soil feels smooth..... | silty clay |

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Appendix B. Glossary to Accompany NVCS Vegetation Community Keys

*Some definitions from Grossman et. al 1998.

A Horizon—See **Soil Horizons**.

Acidic Forest—Forested areas having acidic (pH typically less than 5.5), nutrient-poor soils.

Alluvial Terrace—A terraced embankment of loose material adjacent to the sides of a river valley or stream course deposited by rising and falling water levels.

Amphibolite—See **Mafic Rock/Mafic Substrate**.

Annual—1. A plant which germinates from seeds, flowers, sets seeds, and dies the same year. For NVCS, also includes biennial plants, which may germinate from seed, overwinter as a basal rosette, flower, set seeds, and die the second year. *2. (**in reference to cover type**) Herbaceous vegetation composed of more than 50% annual species.

B Horizon—See **Soil Horizons**.

Backdunes—Sheltered zone of vegetation located behind the sparsely-vegetated foredune and interdunal swales. The first level of backdunes is typically composed of shrubs and salt/wind sheared dwarf trees (see **Maritime Shrublands**). Further away from the beach, the effects of salt and wind is less, and larger trees may develop (see **Maritime Forest**). See also **Foredunes** and **Interdunal Swales**.

Bare Soil (mineral/organic)—Includes small particles less than 0.1-millimeter diameter.

Base-Rich Soils—Soil which has relatively high levels of chemical bases, such as calcium or magnesium ions. These chemicals are alkalis, and so such environments are neutral or alkaline, and are occupied by species tolerant of these conditions or requiring them.

Basin Swamp—A relatively large and irregularly shaped basin that is not associated with rivers, but is vegetated with hydrophytic trees and shrubs that can withstand an extended hydroperiod. Dominant plants include blackgum (*Nyssa biflora*), red maple (*Acer rubrum*), pond cypress (*Taxodium ascendens*), and slash pine (*Pinus elliotii*). Also known as bayheads.

Baygall—Densely forested, peat-filled seepage depressions often at the base of sandy slopes. The canopy is composed of tall, densely packed, generally straight-boled evergreen hardwoods dominated by sweetbay (*Magnolia virginica*), swamp bay (*Persea palustris*), and loblolly bay (*Gordonia lasianthus*).

Bedrock—1. The solid rock that underlies loose material, such as soil, sand, clay, or gravel. *2. (**in reference to cover type**) Sheets of bedrock exposed at the surface.

Bottomlands/Bottomland Forest/Bottomland Hammock- Bottomland/hydric hammocks occur in low-lying and floodplain areas (see also Riparian Forest), lack live oak as a dominant component, and may support more hydrophytic species, such as Swamp Chestnut Oak (*Quercus michauxii*), Laurel Oak (*Quercus laurifolia*), Red Maple (*Acer rubrum*), Sweetbay (*Magnolia virginiana*), and Swamp Ash (*Fraxinus caroliniana*). See also Floodplain, Hydrophytic.

***Brackish**—Water with a salinity of 0.5-30ppt.

Broad-Leaf—1. A plant having relatively broad and flat rather than needlelike or scale-like leaves.
*2. (in reference to cover type) Woody vegetation primarily broad-leaved (generally contribute to greater than 50% of the total woody cover).

***Broad-Leaf-Herbaceous (Forb) (in reference to cover type)**—Herbaceous vegetation composed of more than 50% broad-leaf forb species. See also **Broad-Leaf (1)**.

C Horizon—See Soil Horizons.

Calcareous Sands—Sand which is composed primarily of calcium carbonate from debris of once living marine plankton whose shells are composed of calcium carbonate (CaCO₃). Occurs in the southeast only in South Florida. See also **Calcareous Soils**.

Calcareous Soils (High Calcium Soils)—Relatively alkaline soils, typically in coastal terrestrial environments, caused by natural shell deposits, shell hashes, Amerindian shell middens, or calcareous sands (see also **Shell Hashes, Shell Middens, Calcareous Sand**).

Canopy—Generally, the area above the **forest** floor where the tree crowns meet. In woodlands, tree density may be widely spaced, and thus crowns of trees in the canopy may not meet. Trees of the canopy layer are typically greater than 4.0cm DBH and over 5 ft tall.

Circumneutral Forest—Forest having neutral (pH 7) or weakly acidic soil water (pH generally higher than 6).

Clay—See **Soil Texture**.

Clay Loam—See **Soil Texture**.

Clay—See **Soil Texture**.

Closed Stand—See **Forest**.

Cold Deciduous—1. Plants that lose their leaves due to harsh winter temperatures. Dominant species include larch (*Larix* spp.), quaking aspen (*Populus tremuloides*), and birch (*Betula* spp.). Occurs much further north and/or west than any of the parks in the Southeast Coast Network. *2. (in reference to cover type) Greater than 75% of the total woody cover sheds its foliage simultaneously in connection with the unfavorable season. Unfavorable season mainly characterized by winter frost.

Deciduous—1. Falling off at maturity or tending to fall off and is typically used in reference to trees or shrubs that lose their leaves seasonally and to the shedding of other plant structures such as petals after flowering or fruit when ripe. *2. (in reference to cover type) Greater than 75% of the total woody cover sheds its foliage simultaneously in connection with the unfavorable season. The unfavorable season typically involves a shorter photoperiod and cooler temperatures (autumn-early winter).

Depression—Generally, a landform sunken or depressed below the surrounding area. In the southeast, landform depressions are typically wetlands, being often saturated, temporarily flooded, or permanently flooded.

Dome Swamp—An isolated, forested, depression wetland occurring within a fire-maintained community such as mesic flatwoods (see also **Mesic** and **Flatwoods**) with poorly drained or very poorly drained soils. These swamps are generally small, but may also be large and shallow. The characteristic dome shape is created by smaller trees that grow in the shallower waters of the outer edge, while taller trees grow in the deeper water in the interior of the swamp. Pond cypress (*Taxodium ascendens*) often dominates, but swamp tupelo (*Nyssa sylvatica* var. *biflora*), may also form pure stands or occur as a co-dominant. See also **Poorly Drained, Very Poorly Drained**.

Drought Deciduous—Unfavorable season mainly characterized by drought, in most cases winter drought. Foliage is shed regularly every year. Most trees with relatively thick, fissured bark.

Dune Swale—See **Interdunal Swale**.

Dwarf-Shrubland—1. Low-growing shrub community with shrubs usually under 0.5m tall. *2. (in reference to cover type) Low growing shrubs with individuals or clumps overlapping to not touching (generally forming more than 25% cover, trees and tall shrubs generally less than 25% cover). Dwarf-shrub cover may be less than 25% where it exceeds tree, shrub, herb, and nonvascular cover, respectively.

E Horizon—See **Soil Horizons**.

Evergreen—1. A plant that has leaves in all seasons. *2. (in reference to cover type) Greater than 75% of the total woody cover is never without green foliage

Flatwoods—Fire dependent ecological community in the Southeastern coastal plain, dominated by longleaf pine (*Pinus palustris*), slash pine (*Pinus elliotii*), saw palmetto (*Serenoa repens*), and gallberry (*Ilex glabra*). Natural flatwoods are characterized by low basal area and large widely spaced mature pine, however, tree density is much higher in fire suppressed communities, and in communities with introduced loblolly (*Pinus taeda*) and slash pine.

Floodplain—Flat or nearly flat land adjacent to a stream or river that experiences occasional or periodic flooding.

Forb—Herbaceous flowering plants that are not graminoids (grasses, sedges and rushes). Includes all herbaceous dicots and non-graminoid monocots. See also **Graminoid**.

Foredunes—Dunes located immediately adjacent to the beach, also called primary dunes, that are subject to constant stress from wind and salt spray. Typically dominated by sea oats (*Uniola paniculata*), or searocket (*Cakile edentula*). Beach pennywort (*Hydrocotyle bonariensis*), bitter panicum (*Panicum amarum*), and saltmeadow cordgrass (*Spartina patens*) may also be common.

Forest—1. An area with a high density of trees. *2. (**in reference to cover type**) Trees with their crowns overlapping (generally forming 60–100% cover).

*Freshwater—Water with a salinity of less than 0.5 ppt.

Gleying/Gleyed Matrix—Soils that have a gleyed matrix have the following combinations of hue, value, and chroma (see the Gley pages of a soil color chart, such as a Munsell chart) and the soils are not glauconitic (a mineral aggregate containing micaceous minerals that result in a green color):

1. 10Y, 5GY, 10GY, 10G, 5BG, 10BG, 5B, 10B, or 5PB w/ value 4 or more & chroma 1 or 2, or:
2. 5G with value 4 or more and chroma 1 or 2, or:
3. N with value 4 or more, or:
4. (for testing only) 5Y, value 4 or more, and chroma 1.

In some places, the gleyed matrix may change color upon exposure to air (reduced matrix). This phenomenon is included in the concept of gleyed matrix.

Graminoid—1. Monocotyledonous, usually herbaceous plants with narrow leaves growing from the base. They include the "true grasses", of the Poaceae family, as well as the sedges (Cyperaceae) and the rushes (Juncaceae). *2. (**in reference to cover type**) Herbaceous vegetation composed of more than 50% graminoid/stipe leaf species.

Groundcover—All herbaceous vegetation and Woody vegetation that is generally less than 1 centimeter (0.4 inch) DBH and less than about 5 feet (1.5 meters) in height.

Halophytic Vegetation/Halophyte—Plants that naturally grows where it is affected by salinity in the root area or by salt spray, such as in mangrove swamps, tidal marshes and sloughs, salt flats and salt pannes, and seashores. Glassworts and Saltworts (*Sarcocornia* spp., *Salicornia* spp, and *Batis maritima*) are examples.

Hammock—Mixed evergreen-deciduous hardwood ecosystems typically dominated by Live Oak (*Quercus virginiana*) (except **Bottomland Hammocks**). Other overstory species include southern magnolia (*Magnolia grandiflora*), Pignut hickory (*Carya glabra*), sweetgum (*Liquidambar styraciflua*), beech (*Fagus grandifolia*) and cabbage palm (*Sabal palmetto*). Dogwood (*Cornus florida*), hophornbeam (*Ostrya virginiana*), and other oaks (*Quercus* spp.) frequently appear in the understory.

Hardwood—Angiosperm (flowering) trees. Generally, hardwoods include all tree species that are not coniferous (pines, cypress, juniper, spruce, firs, etc.).

Heath—Any number of woody shrubs and small trees belonging to the Ericaceae family. Includes *Gaylussacia* spp., *Rhododendron* spp., and *Vaccinium* spp.

Herbaceous—1. A plant that has leaves and stems that die down at the end of the growing season to the soil level. They have no persistent woody stem above ground. Herbaceous plants may be annuals, biennials or perennials. *2. (**in reference to cover type**) Herbs (graminoids, forbs, and ferns) dominant (generally forming at least 25% cover; trees, shrubs, and dwarf-shrubs generally with less than 25% cover). Herb cover may be less than 25% where it exceeds tree, shrub, dwarf-shrub, and nonvascular cover, respectively.

High Calcium Soils—See **Calcareous Soils**.

High Salt Marsh—Areas of salt marsh flooded only during extreme high tides and storm events. Dominated by Black needlerush (*Juncus roemerianus*), Saltmeadow cordgrass (*Spartina patens*), Marsh elder (*Iva frutescens*), Bushy seaside tansy (*Borrchia frutescens*), and/or Groundsel tree (*Baccharis halimifolia*).

Hypersaline Flat—See **Salt Panne**.

Hydric—Habitat characterized by excessive moisture, remaining saturated or inundated for long periods. See also **Saturated**.

Hydric Hammock—See **Bottomlands/Bottomland Forest/Bottomland Hammock**.

Hydric Soil—A soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.

Hydrophytic Vegetation—Plant life capable of growing in wet (hydric) conditions, such as in water or in soil or other substrate that is periodically saturated with water. See also **Hydric**, **Saturated**.

Interdunal Swales—Marshes, moist grasslands, dense shrubs, or damp flats in linear depressions formed between successive dune ridges as sandy barrier islands, capes, or beach plains build seaward.

***Intermittently Flooded**—Substrate is usually exposed, but surface water can be present for variable periods without detectable seasonal periodicity. Inundation is not predictable to a given season and is dependent upon highly localized rain storms. Can apply to both wetland and non-wetland situations.

***Large Rocks**—Includes boulders and cobbles (inorganic material) greater than 10 centimeters (3.9 inches) diameter.

Liana—High-climbing woody vines. Examples include poison ivy (*Toxicodendron radicans*), trumpetvine (*Campsis radicans*), grape (*Vitis* spp.), and climbing hydrangea (*Decumaria barbara*). See also **Woody Vines**.

Litter and Duff—Litter includes freshly fallen leaves, needles, twigs, bark, fruits, and wood fragments less than 1cm. Duff is the fermentation layer and humus layer (organic horizon) composed of partially decomposed litter material (but not yet muck). See also **Muck/Muck Soils**.

Loam—see **Soil Texture**.

Loamy Sand—see **Soil Texture**.

Low Salt Marsh—Areas of frequently tidally flooded saltmarsh dominated by smooth cord-grass (*Spartina alterniflora*) which form along the coast in protected bays, along rivers, and behind barrier islands.

Mafic Rock/Mafic Substrate—Igneous rock that is dominated by the silicates pyroxene, amphibole, olivine, and mica. These minerals are high in magnesium and ferric oxides, and their presence gives mafic rock its characteristic dark color. Mafic rock is commonly contrasted with felsic rock, in which light-colored minerals predominate. Common mafic rocks include basalt and its coarse-grained intrusive equivalent, gabbro, as well as amphibolite. Areas underlain by mafic substrate have higher pH than other areas (typically 5.5–7). Thus, acid-loving species, such as blueberries (*Vaccinium* sp.) are often absent or sparse.

Maritime Forest—An ocean coastal wooded habitat (see also **Forest** and **Woodland**) found on backdunes or on higher ground than dune areas that is subject to salt spray and offshore winds. Trees in this community sometimes appear (but not always) to be gnarled, to lean in the same direction, or appear as “bonsai” due to the stress of continuous salt spray and prevailing winds. See also **Backdunes**.

Maritime Shrubland—A shrub community (see also **Shrubland**) subject to salt spray and offshore winds, typically located in backdune areas. Shrubs are found to be more dominant than herbaceous species. Shrubs may often appear “lean” in the same direction, appear to be sheared off, or appear as “bonsai” due to the stress of continuous salt spray and prevailing winds. See also **Backdunes**.

Mesic—Habitat with a moderate or well-balanced supply of moisture (not very dry or very wet).

Mesophytic—Terrestrial plants which are adapted to neither a particularly dry nor particularly wet (mesic) environment. Generally, mesophytes include “generalist” type plants that can tolerate a wide range of hydrologic regimes, such as red maple (*Acer rubum*) and sweetgum (*Liquidambar styraciflua*)

Microphyllous—1. Plants having very small leaves. *2. (in reference to cover type) Woody cover that is primarily (>50%) microphyllous.

***Mixed Evergreen-Cold Deciduous**—Evergreen and cold-deciduous species admixed. See also **Mixed Evergreen-Deciduous**.

***Mixed Evergreen-Deciduous**—Evergreen and deciduous species generally contribute 25-75% of the total woody cover. See also **Evergreen and Deciduous**.

***Mixed Evergreen-Drought Deciduous**—Evergreen and drought-deciduous species admixed. See also **Mixed Evergreen-Deciduous**, **Evergreen and Drought Deciduous**.

***Moderately Well Drained**—The soil moisture in excess of field capacity remains for a small but significant period of the year. Soils are commonly mottled (chroma < 2) in the lower B and C horizons or below a depth of 2 feet. The Ae horizon, if present, may be faintly mottled in fine-textured soils and in medium-textured soils that have a slowly permeable layer below the solum. In grassland soils the B and C horizons may be only faintly mottled and the A horizon may be relatively thick and dark. See also **Soil Color**, **Soil Horizons**.

Muck/Muck Soil—A sapric organic soil material in which virtually all the organic material is decomposed, not allowing for identification of plant forms. When rubbed between thumb and forefinger, has a slick, greasy texture with no grit.

Needle-Leaf—1. A slender, needle-shaped leaf, with a typically rounded cross section. *2. (**in reference to cover type**) Woody vegetation primarily needle-leaved (generally contribute to greater than 50% cover).

Nonvascular—1. Plants lacking vascular tissues (xylem and phloem). Includes bryophytes (mosses and liverworts), non-curstose lichens, and algae. *2. (**in reference to cover type**) Nonvascular cover dominant (generally forming at least 25% cover). Nonvascular cover may be less than 25% where it exceeds tree, shrub, dwarf-shrub, and herb cover, respectively.

O Horizon—See **Soil Horizons**.

Open Stand—See **Woodland**.

Perennial—1. A plant that lives three or more years. *2. (**in reference to cover type**) Herbaceous vegetation composed of more than 50% perennial species.

***Permanently Flooded**—Water covers the land surface at all times of the year in all years.

***Permanently Flooded-Tidal**—Salt water covers the land surface at all times of the year in all years. This applies only to permanently flooded areas irregularly flooded by fresh tidal water.

***Poorly Drained**—The soil moisture in excess of field capacity remains in all horizons for a large part of the year. The soils are usually very strongly gleyed (see also **Gleying/Gleyed Matrix**). Except in high-chroma parent materials the B, if present, and upper C horizons usually have matrix colors of low chroma. Faint mottling may occur throughout. See also **Soil Color**, **Soil Horizons**.

Primary Dunes—See **Foredunes**.

Pteridophyte—1. Vascular plants (plants with xylem and phloem) that produce neither flowers nor seeds. Instead, they reproduce and disperse only via spores. Includes all true ferns (leptosporangiate ferns) and fern allies (lycophods, equisetoids, psilophytes, and marratioids). *2. (**in reference to cover type**) Herbaceous vegetation composed of more than 50% species with frond or frond-like leaves (ferns and fern allies).

Rack/Rack Line—See **Wrack** (Rack is a misspelling).

***Rapidly Drained**—The soil moisture content seldom exceeds field capacity in any horizon except immediately after water addition. Soils are free from any evidence of gleying (see also **Gleying/Gleyed Matrix**) throughout the profile. Rapidly drained soils are commonly coarse textured or soils on steep slopes.

Riparian Forest—A forested area of land adjacent to a body of water such as a river, stream, pond, lake, marshland, estuary, canal, sink or reservoir that is subject to frequent inundation and/or saturation. See also **Forest, Saturated, Intermittently Flooded**.

Riverine Forest—See **Riparian Forest**.

Ruderal—Disturbed communities consisting of many early-successional groundcover or young shrub species, many of which may be weedy natives or exotics.

Secondary Dunes—See **Backdunes**.

Salt Panne—Water retaining depressions located within salt and brackish marshes. Salt pannes typically form when wrack is deposited upon existing vegetation killing it, thus creating a slight depression in the surrounding vegetation which retains water for varying periods of time. Upon successive cycles of inundation and evaporation the salt panne develops an increased salinity greater than that of the larger body of water. Salt pannes are frequently unvegetated due the extreme salt content, or may have succulent halophytes, such as glasswort or saltwort (*Sarcocornia perennis*, *Salicornia* spp., *Batis maritima*) occurring. See also **Halophytic/Halophyte, Wrack**.

Saltwater—Water with a salinity of at least 30 ppt.

***Sand**—Small inorganic particles 0.1–2 millimeters (0.01–0.2 centimeters) diameter, see also **Soil Texture**.

Sandhills—Upland, xeric, savanna-like habitats on gently rolling terrain and sandy, very well-drained soils, with an open overstory of longleaf pines (*Pinus palustris*) (in its natural condition). Sandhills species are fire dependent, and will rapidly decline in fire suppressed situations. Turkey oaks (*Quercus laevis*) and other hardwood species such as chapmans oak (*Quercus chapmanii*) and myrtle oak (*Quercus myrtifolia*) are common, along with a groundcover of herbaceous grasses (especially wiregrass, *Aristida stricta*), ferns, and wildflowers. Generally, plants of the sandhills community are xerophytic. See also **Upland, Xeric, Xerophytic**.

Sandy Clay—see **Soil Texture**.

Sandy Clay Loam—see **Soil Texture**.

Sandy Loam—see **Soil Texture**.

Saturated—Surface water is seldom present, but substrate is saturated to surface for extended periods during the growing season.

***Seasonally Flooded**—Surface water is present for extended periods during the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is very variable, extending from saturated to a water table well below the ground surface.

Seepage Swamp/Seepage Forest—Sloping seepage wetlands that are distinct from their surrounding upland forests, and are dominated by a variety of wetland plant species. Soils are saturated to seasonally saturated, poorly to very poorly drained and have a shallow muck layer over silty or loamy (occasionally sandy) materials. See also **Muck/Muck Soils, Poorly Drained, Very Poorly Drained, Saturated, Soil Texture, Upland, and Wetland**.

***Semipermanently Flooded**—Surface water persist throughout the growing season in most years. Land surface is normally saturated when water level drops below soil surface.

Shell Hashes—Areas underlain or with exposed limestone that is composed chiefly of compressed molluscan or echinoid shells cemented together. See also **Calcareous Soils**.

Shell Middens—Heaps or piles consisting mostly of mollusk shells that are interpreted as being the waste products of meals eaten by nomadic groups or hunting parties of native peoples. Some are small examples relating to meals had by a handful of individuals, others are many meters in length and width and represent centuries of shell deposition. See also **Calcareous Soils**.

Shrubland—1. A plant community characterized by a dominance of shrub species. *2. (**in reference to cover type**) Shrubs generally greater than 0.5 meters (1.6 feet) tall with individuals or clumps overlapping to not touching (generally forming more than 25% cover, trees generally less than 25% cover). Shrub cover may be less than 25% where it exceeds tree, dwarf-shrub, herb, and nonvascular cover, respectively. Vegetation dominated by woody vines is generally treated in this class.

Silt Loam—see **Soil Texture**.

Silt—see **Soil Texture**.

Silty Clay—see **Soil Texture**.

Silty Clay Loam—see **Soil Texture**.

Slough—A depression or hollow, usually filled with deep mud and typically forming a stagnant swamp, marsh, bog, or pond, especially as part of a bayou, inlet, or backwater branching from a larger water body, such a lake, river, or estuary.

***Small Rocks**—Includes gravel (inorganic material), 0.2–10 centimeters (0.08–3.9 inches) diameter.

Soil Color—Hue, value, and chroma are the three components of soil color. The simple hues for soil are Red (R), Yellow (Y), Green (G), and Blue (B). Intermediate hues are Yellow-Red (YR) and Blue-Green (BG). Value refers to the lightness or darkness of a soil color, with black being the lowest color value and white the highest. Chroma refers to how strong or weak a soil color is. The weaker a color, the lower the chroma and the more gray it has. A hue at its strongest color chroma will have no gray. Refer to a Munsell Soil Color chart for identification of soil color.

Soil Horizons—Distinct layers that lie one above the other, parallel to the soil surface. Each layer has a specific suite of characteristics:

- **O Horizon**—The letter 'O' stands for organic. As the name suggests, this horizon is rich in organic material of plant and animal origin. These materials are generally in various stages of decomposition. This decomposed organic material is called the humus that gives this horizon its characteristic dark color.
- **A Horizon**—This is also known as the 'topsoil', and it is the topmost layer of the mineral soil. However, as it lies just below the O horizon, this layer also has some amount of humus in it. Hence, it is darker in color than the layers lying below it. This layer is also known as the 'biomantle' as it is the A horizon in which most of the biological activities take place. Soil organisms like earthworms, fungi and bacteria are mainly concentrated in this layer. The soil particles in this region are smallest and finest as compared to the lower horizons of the soil.
- **E Horizon**—This layer lies below the A horizon and above the B horizon. It is light in color and contains mainly sand and silt. It is poor in mineral and clay content as these are lost to the lower layer by the process of leaching. Hence, this horizon is also called the layer of eluviation (leaching). The soil particles of this layer are often larger in size than those in the A horizon but smaller than those in the underlying B horizon.
- **B Horizon**—Lies just below the E horizon and is rich in clay and minerals like iron or aluminum. Though this layer has a higher mineral content than the A horizon, some organic material, colloids, soluble salts, or mineral particles may reach this layer from the layers above by the process of leaching (illuviation). Plant roots may reach this layer. The B horizon is typically reddish or brownish due to the accumulation of iron oxides leached from upper layers.
- **C Horizon**—This layer is also known as regolith. The C horizon is mainly made of large rocks or lumps of partially broken bedrock. This layer is least affected by weathering as it lies deep within the soil and is inaccessible to the soil-forming agents. Hence, the rocks in this layer have changed very little since their origin. Plant roots do not reach so deep down to this layer. The C horizon is typically devoid of organic matter.

***Soil Texture**— see Simplified Key to Soil Texture (Brewer and McCann 1982) in Field Methods section

***Somewhat Poorly Drained**—The soil moisture in excess of field capacity remains in subsurface horizons for moderately long periods during the year. Soils are commonly mottled in the B and C horizons; the Ae horizon, if present, may be mottled (see also **Soil Horizons**). The matrix generally has a lower chroma than in the well-drained soil on the similar parent material. See also **Soil Color**.

Sparse Vegetation—1. Areas where very little vegetation is present and abiotic substrate features are dominant. *2. (**in reference to cover type**) Vegetation is scattered to nearly absent and generally restricted to areas of concentrated resources (total vegetation cover is typically less than 25% and greater than 0%).

Spoil Island—Small artificial islands in nearshore rivers, channels, canals, and estuaries that are composed of dredge spoil material from the construction of navigation channels.

Stream Terrace— See **Alluvial Terrace**.

Subcanopy—Woody vegetation that is typically 1.0-4.0cm DBH (though may be larger DBH) and is intermediate in height between smaller groundcover and upper canopy, typically over 5ft in height. See also **Groundcover** and **Canopy**.

Successional Forest—Forest affected by changes in composition or structure proceeding disturbance events. Early successional forests may be dominated by young shrubs or small trees, and may be composed primarily of opportunistic mesophytic species, such as sweetgum (*Liquidambar styraciflua*). Early successional communities may also be populated by exotic, invasive species, such as Brazilian pepper (*Schinus terebinthefolius*) and chinese privet (*Ligustrum sinense*). Mid and late successional forests are populated by fewer shrub species and larger tree specimens. Mesophytic species may still dominate, however transition to species with a narrower habitat range (for instance, wetland species, species adapted to basic soils, or xerophytic species) may be evident.

Swales—See **Interdunal Swales**.

***Temporarily Flooded**—Surface water present for brief periods during the growing season, but water table usually lies well below soil surface.

Tidal Flats—Intertidal, non-vegetated, soft sediment habitats, found between mean high-water and mean low-water spring tide and are generally located in estuaries and other low energy marine environments.

Tidal Shrubland—See **High Salt Marsh**.

Tidal Salt Marsh—See **Low Salt Marsh**.

Tidal Marsh—See **Low Salt Marsh**.

Tidally Flooded Forest—Also known as mangrove forest, a plant community typically of central and southern coastal Florida that are frequently flooded by salt or brackish water and are composed of any number of mangrove species, including red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), and white mangrove (*Laguncularia racemosa*). Buttonwood (*Conocarpus erectus*) may co-occur.

Upland—Areas not meeting the criteria for wetlands. See also **Wetlands**.

***Very Poorly Drained**—Free water remains at or within 12 inches of the surface most of the year. The soils are usually very strongly gleyed (see also **Gleying/Gleyed Matrix**). Subsurface horizons usually are of low chroma and yellowish to bluish hues (see also **Soil Color**). Mottling may be present but at depth in the profiles. Very poorly drained soils usually have a mucky (see **Muck/Muck Soils**) or peaty surface horizon.

***Well Drained**—The soil moisture content does not normally exceed field capacity in any horizon (except possibly the C) (see also **Soil Horizons**) for a significant part of the year. Soils are usually free from mottling in the upper 3 feet, but may be mottled below this depth. B horizons, if present, are reddish, brownish, or yellowish (see also **Soil Color**).

Wetland—An area that has hydrophytic vegetation, hydric soils, and wetland hydrology, per the Food Security Act of 1985 and the U.S. Corps of Engineers, 1987 Wetland Delineation Manual. See also **Hydric Soil, Hydrophytic Vegetation, and Wetland Hydrology**.

Wetland Hydrology—Evidence that an area is inundated permanently or periodically by either groundwater, surface water and/or precipitation.

Woodland—1. A area with trees present and a largely-open canopy, with sunlight penetrating between trees. *2. (in reference to cover type)- Open stands of trees with crowns not usually touching (generally forming 25-60% cover). Canopy tree cover may be less than 25% in cases where is exceeds shrub, dwarf-shrub, herb, and nonvascular cover, respectively.

Woody Vines—Species with a vining habit that also possess secondary (woody) tissues. Example include poison ivy (*Toxicodendron radicans*), trumpetvine (*Campsis radicans*), grape (*Vitis* spp.), sweet peppervine (*Ampelopsis arborea*), climbing hydrangea (*Decumaria barbara*), and some species of greenbriar (*Smilax* spp.). See also **Liana**.

Wrack—Organic and inorganic debris deposited by receding tides. Wrack can be composed of decomposing grass or other vegetation, seaweeds, decaying animals, or anthropogenic refuse. The wrack line (rack line, misspelled), is the linear deposition of this material in tidal marshes or on beaches.

Xeric—Of, characterized by, or adapted to an extremely dry habitat.

Xerophytic/Xerophyte—Species adapted to life in xeric habitats. Many xerophytic species in the SECN occur in sandhills habitats. Examples of southeastern xerophytic plants include turkey oak

(*Quercus laevis*), longleaf pine (*Pinus palustris*), bracken fern (*Pteridium aquilinum*), and false rosemary (*Ceratiola ericoides*). See also **Sandhills, Xeric**.

Literature Cited

Grossman, D. H., D. Faber-Langendoen, A. S. Weakly, M. Anderson, P. Bourgeron, R. Crawford, K. Goodin, S. Landaal, K. Metzler, K. D. Patterson, M. Pyne, M. Reid, and L. Snedon. 1998. International classification of ecological communities: Terrestrial vegetation of the United States. Volume I: The vegetation classification standard. Arlington, VA: The Nature Conservancy. Available at: <https://www.csu.edu/cerc/researchreports/documents/TerrestrialVegetationUnitedStatesVolumeI.pdf> (last accessed August 2019).