Module 4: Understanding Off-Site and On-Site Methods for Determining if Under Normal Circumstances the Site Supports the Prevalence of FSA Hydrophytic Vegetation, Hydric Soils, and Hydrology

In this module, the course participant will be presented with the methodology and sampling strategy to determine if, under normal circumstances, a site supports Hydrophytic Vegetation, Hydric Soils, and Hydrology as defined by the FSA to make a certified wetland determination. The FSA Wetland Identification Procedures provides for two decision-making methods, Off-Site and On-Site. The Off-Site method does not require in-the-field sampling. The On-Site method or "in-the-field" does require a level of skill and knowledge on how to develop a sampling protocol, implement vegetation measurement tools, and determine whether or not a sampling unit(s) is a wetland.

Developer:

Modified from the National Wetland Phase I Training Course

Michelle Schuman, Palmer, AK, State Resource Ecologist

Alaska NRCS

Module 4- Understanding Off-Site and On-Site Methods for Determining if Under Normal Circumstances the Site Supports the Prevalence of FSA Hydrophytic Vegetation, Hydric Soils, and Hydrology.

Objectives

Upon completion of this module, the student will:

- **Implement the Off-Site Methods for determining if a site is a FSA Certified Wetland**
- **Understand the requirements between the use of Off-Site and On-Site Methods**
- **Become familiar with the US Army Corps of Engineers Manual (COEM) and USDA NRCS websites and other reference material**
- **Become familiar with the different tools and information available to assist in wetland determination**
- **Become familiar with the basics of how to conduct an On-Site Wetland Determination**
- **Understand and be able to apply the indicators for each wetland factor**

Key Concepts

- Understand the differences and when to use the Off-Site and On-Site Method
- Recognize the different sampling strategies and how to implement a sampling effort
- Understand and apply indicators of dominance for the vegetation factor.
- Disturbance and changing climatic/hydrologic conditions can make decision making more difficult. The Corps provides recommended solutions to these problems (Problem Area) in their 1987 Manual (Part IV; Sections F and G) and Regional Supplements (Chapter 5)

This module is designed to take 3-4 hours and includes required exercises. Links are provided to necessary information and additional learning opportunities.

Learning Concept 4-1: Off-Site Method

- **Understand the difference between Off-Site and On-site Methods**

- **Become familiar with and how to use the Corps of Engineers 404 Wetland Manual, the National Food Security Act Manual, and other reference material**
- **Be able to conduct an Off-Site wetland determination**

This Learning Concept is designed to take 30-45 minutes and includes office exercises. Links are provided as optional learning opportunities.

Of the three wetland factors, vegetation is the most easily observed for both Off-site and On-site methods. For this reason, designing a sampling method and strategy is normally based on the plant community. The other two factors are then sampled once the vegetation community has been identified. A variety of methods are used to characterize vegetation for wetland delineation purposes. References and guidelines for this section include the Corps of Engineers Wetland Delineation Manual (COEM), Regional Supplement to the COEM (if any), and other national and state technical notes and guidance documents.

The purpose of a wetland determination sampling strategy is to characterize the site in question rapidly without the need for detailed scientific study or statistical methods. In most cases, hydric soils, hydrology, and hydrophytic vegetation decisions are based on a single point in time. These indicators are used to make a determination if the three wetland factors would occur on the site during periods of *normal environmental conditions(NEC)* and *normal circumstances(NC)* (refer to Module 2).

A FSA (Food Security Act) wetland *"determination"* involves applying the appropriate NFSAM (National Food Security Act Manual) method and intensity required to decide if a *sampling unit* meets the FSA wetland definition within the quality mandate defined for a certified wetland determination [7 CFR 12.30 (c):

"*Certification of a wetland determination means that the wetland determination is of sufficient quality to make a determination of ineligibility for program benefits under Sec. 12.4 of this part*]. "

A FSA wetland *"delineation"* involves the identification and delineation of the *sampling units* with different FSA Wetland Labels (refer to MODULE 1 and 2).

Methods: OFF-SITE and ON-SITE

NRCS conducts wetland determinations through the use of two methods. Both methods use the indicator-based approach and consider all three wetland factors (as provided by Congress in the FSA wetland definition) in the decision making process. The two methods are similar to the COE Routine Method found in Section C: Selection of Method. One difference between the COEM and the NFSAM - NRCS *does not use* the Comprehensive Method. NRCS only uses the routine method (refer to Variances in the NFSAM).

The wetland specialist must determine the most appropriate method and sampling intensity for each project based on site conditions and the *purpose of the request*. For example, site visits are *statutorily required (1) when requested by the program participant, (2) when a determination is appealed, and (3) prior to making a final determination that may result in a determination of ineligibility (e.g. FSA label of CW or CW-year).*

Each method is described using a step-by-step process. The steps 1 through 5 are basically the same for both methods. It is the responsibility of the wetland specialist working with the conservation planner to decide which method is most appropriate for the project area. All three wetland factors are addressed in the Off-Site and the On-Site Methods.

Why is this important to me? In the development of the Off-Site Method and On-Site Method, it is important to recognize that the application of NFSAM Off-Site Method does not prohibit a site visit/investigation/determination, nor is the On-Site Method limited to field indicators. The expectation is that the wetland specialist utilizes all valid information when either method is used. The distinction between the two methods are below and complement the NFSAM, the COEM and the Alaska Supplement:

- The Off-Site Method[1] determines the presence or absence of a *prevalence of hydrophytic vegetation,* hydric *soils*, and *hydrology*. The Off-site method is normally based on **indicators (**i.e., no vegetation is sampled or indicators are not during NEC or under NC) **but tools for direct observation** may also be available. Indirect indicators can include known plant/site associations, ecological site descriptions, soil survey information, HGM models, local knowledge by experts or a rapid visual assessment of the dominant plant species within the project area. This method can be used when the sampling unit is **obviously not a wetland**, **obviously is a wetland,** or when a sampling unit is disturbed such that a reference site is not available or the three wetland factors cannot be obtained using the On-Site Method.
- The On-Site Method[2] can use both direct observation and **indicators** (vegetation is sampled, observations of conditions under NC and NEC) but data is collected on the site to determine the presence or absence of a *prevalence of hydrophytic vegetation, hydric soils, and hydrology*. This method is used when the Off-Site Method fails to provide the wetland specialist with the level of confidence needed to make a decision if the project area is a wetland.
- The Off-site Method must be made within 15 calendar days from receipt of the Form AD-1026 or an On-Site determination within 60 calendar days unless weather or a heavy workload does not permit. The Off-site is always done first (M_180_NFSAM-510_C, 5th Edition).

Access the COEM and read Section C – Selection of Method. Read the discussion of the three levels of a Routine Determinination. What Level would the Off-Site Method correspond to? What Level would the On-Site Method correspond to? Regarding a simple decision on the prevalence of FSA hydrophytic vegetation, can you invision utilizing the Off-Site Method for any situations in your work area? When would you NOT use the Off-Site Method?

An indicator is any single piece of evidence that is suggestive that any one of the three diagnostic wetland factors does occur (hydrophytic vegetation, hydric soils, or wetland hydrology). **Indicators are used at the diagnostic factor level, not at the wetland decision-making level**. At any sampling unit, indicators for the factor being considered may be absent or there might be one or multiple indicators of the factor. The presence or absence of an indicator provides evidence (along with other evidence and best professional judgment) in rendering a decision. With the indicator-based approach the mandate is not to demonstrate or prove scientifically that the sampling unit would meet the wetland definition under normal circumstances. Rather, the indicator-based approach allows for a timely decision based on indicators (circumstantial evidence) without the need for long-term monitoring under scientific rigor and statistical analysis or rescheduling of the site visit to a time when ideal conditions exist (normal circumstances).

It is important to understand the difference between (1) direct observation and (2) an indicator

[1] Refer to the COE 1987 Manual Part IV: Section C-Selection of Method: level 1: On-site Inspection Unnecessary
[2] Refer to the COE 1987 Manual Part IV: Section C-Selection of Method: level 2: On-site Inspection Necessary. Note that NRCS policy only supports the routine method.

(circumstantial evidence) for FSA purposes. A direct observation is when the FSA definition of a factor is actually observed within the sampling unit during normal circumstances and during normal environmental conditions. The direct observation may actually be utilizing remotely sensed data. For example, a planner has a lidar image of the sampling unit in question that shows plants growing in water during the growing season of a normal climate year. You are directly observing the vegetation under ideal situations according to FSA! Direct observations have an advantage of being rapid and sound but, the timing of the site visit or climate conditions may not allow the use of direct observation. In those situations, indicators are more common that direct observation because rarely is the site visit made during ideal conditions. Indicators are located in the Alaska Supplement located on the:

https://nrcs.sc.egov.usda.gov/west/ak/ecological_sciences/

OFF-SITE METHOD

Step 1. Preliminary Data Gathering and Synthesis. Locate, compile, and analyze data sources for the project area. The following data sources are an essential step for both the Off-Site Method and On-Site Method. Much of this information is already collected during the inventory and evaluation phase of planning and can also be found within the Geodata Folder on your server (refer to the "One Big Wetland" layer). First, access Alaska SharePoint Site and print off the "forms" that you will need (Form 1 and 2, NEC and Long Term Rainfall Summary, Form 3 – Data Source elements and Indicators, and Form 4 – Summary of Data Source Elements & Indicators). Once this information is gathered, proceed to **Step 2.** *Note: Be aware that links sometimes break so also search the web if needed.*

Soils/Vegetation/Landform/Hydrology

1. Locally available aerial imagery (X:\geodata\geodata_layers\One Big Wetland Layer_v2.lyr). The "one Big Wetland layer" contains imagery, soils, climate, topography and vegetation, etc.
2. Soil survey information (published or unpublished maps and data). This includes soils information on the Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/), Soils Data Mart http://soildatamart.nrcs.usda.gov/County.aspx?State=AK), and Ecological Site Descriptions (http://esis.sc.egov.usda.gov) and/ or the FOTG https://efotg.sc.egov.usda.gov/
3. Wetland inventories (National Wetland Inventory, other wetland inventories): http://www.fws.gov/wetlands/Data/Mapper.html

Climate

1. NRCS National Water & Climate Center main web site http://www.wcc.nrcs.usda.gov/
2. Climate Analysis for Wetlands by County (WETS tables, current up to 2001): http://www.wcc.nrcs.usda.gov/cgibin/getwetco.pl?state=ak; http://www.wcc.nrcs.usda.gov/cgibin/state.pl?state=ak;
3. Western Regional Climate Center which has a list of Alaska Climate Summaries by Location: http://www.wrcc.dri.edu/summary/Climsmak.html;
4. State of Alaska Climate Charts: http://www.climate-charts.com/States/Alaska.html;
5. National Weather Service, Alaska Region Headquarters: http://www.arh.noaa.gov/obs.php
6. Climate data: Web WIMP http://climate.geog.udel.edu/~wimp/ - web based, water budget modeling program

Step 2. Identify and Delineate Sampling Units on a base map. Using the available data sources from Step 1, mark the project area boundaries and delineate sampling units on the base map. *Sampling units* are separated based on changes in landscape position, vegetation, soils, and/or hydrology. These changes can be apparent or subtle. A project might be so small and/or homogeneous that one *sampling unit* is sufficient, but other projects may require multiple *sampling units*. Once the sampling units have been delineated on the base map, proceed to **Step 3.**

Why is this important to me? The objective of separating the project area into *sampling units* is to reduce the variability within a *sampling unit* so a decision can be based on data within an acceptable tolerance of variability. Remember, the wetland determination process consists of three independent steps, (1) wetland identification, (2) assignment of wetland labels, and (3) determining size of each type. It is not known yet if the sampling unit is a wetland or not. The sampling unit(s) is differentiated based on differences on the imagery.

Step 3. Determine if the *Sampling Units* support *Normal Circumstances* (NC). Data sources that best represent 1985 conditions and the most recent conditions are targeted to determine if the sampling unit supports *normal circumstances* (refer to COEM, NFSAM). All hydrology alterations installed prior to 1985 are noted (i.e. surface drainage, subsurface drainage, micro/macro topographic features, levees, diversions, terraces). The information of pre-1985 conditions are then compared to current/recent conditions. A *normal circumstances* decision is then rendered for each preliminary *sampling unit*. If it is determined that the *sampling unit* supports *normal circumstances*, proceed to **Step 4.** If the sampling unit does not support *normal circumstances*, then the date (year) of the alteration(s) should be determined. The wetland determination is then based, not on current conditions, but rather on the conditions prior to the alteration(s) in question. Document the findings on *Form 3, Data Source Elements and Indicators,* and then proceed to **Step 4**.

Step 4. Decide if the Sampling Units reflect Normal Environmental Conditions (NEC). Data source information collected in Step 1 can be used to evaluate whether *normal environmental conditions* are present. If normal environmental conditions exist, proceed to **Step 5**. The wetland specialist must make a decision based on normal environmental conditions for each of the wetland factors. If normal environmental conditions do not exist, and the wetland specialist cannot make a defendable decision, the wetland specialist needs to postpone the determination and/or use the On-Site Method (refer to Key Concept 1 above). Resources available to make a NEC decision are:

- Multiple years of aerial imagery
- WET tables (http://www.wcc.nrcs.usda.gov/climate/wetlands.html)
- Personal knowledge (or personal communication) of the site

Record information on Form 1 and/or form 2 if applicable

Step 5. Determine whether available data are sufficient for the project area. Tally and analyze the summarized data on *Form 4 Summary of Data Source Elements & Indicators* from the previous steps and determine if the vegetation, soils, and hydrology of the project area is adequately characterized. If so, proceed to **Step 6**. If not, then the On-Site Method will be used. If the area cannot be adequately characterized for each wetland factor, the wetland specialist should explain this on Form 4 and state that an On-site wetland determination will be necessary. It is important to do this early in the planning process to allow a site visit during the growing season prior to installation of a practice.

Step 6. Determine a prevalence of Hydrophytic Vegetation, Hydric Soils, and Hydrology. The wetland factors within the sampling unit(s) are more than likely, not directly observed and therefore are indicators to help assess whether or not the three wetland factors are present during NC and NEC. It is essential to have an understanding of the land use, weather patterns, and landscape conditions associated with the site being evaluated in order to accurately interpret aerial imagery. Each indicator is listed on Form 3 as a “yes”, “no” or “N/A”.

There should be at least two strong indicators for each wetland factor which can support the decision if a prevalence of the three wetland factors is prevalent. In some cases, there might be several indicators but the wetland specialist may still not be confident in making a decision and decide to do an on-site. In some cases, especially in remote areas of Alaska, there may only be one indicator for a wetland factor. In that case, again, the wetland specialist and planner must decide if there is enough information to be confident in a decision. Remember the definition of a FSA Certified Wetland Determination and the “indicators” for supporting a decision also include best professional judgment. In signing the 026e, the Designated Conservationist is confident in the wetland and HEL decision(s) on the form. Proceed

to **Step 7** if the sampling unit (s) is considered to be a wetland. Proceed to **Step 8** if the sampling unit (s) is not considered to be a wetland.

Vegetation. Direct observation or Indirect indicators of the presence or absence of a prevalence of hydrophytic vegetation is used to evaluate each sampling unit. General guidance for indicators can include NWI, Land Fire, Imagery, Site Photo, Local expertise, and ecological site description (ESD):

- If 50% or more of the remote resources considered are valid for supporting hydrophytic vegetation record "yes" and the sampling unit is suspected (under normal circumstances and normal environmental conditions) to support a prevalence of hydrophytic vegetation.
- If less than 50% of the remote resources considered do not support hydrophytic vegetation, then record "no" the sampling unit is suspected (under normal circumstances and normal environmental conditions) not to support a prevalence of hydrophytic vegetation.

Soils. Direct observation or Indirect indicators of the presence or absence of hydric soils are used to evaluate each sampling unit. Using remote resources to indicate the prevalence of hydric soils such as the hydric soils map, topography, and landform (mountain-side, convex/concave, toe-slope, active floodplain or low terrace) is highly scale-dependent and project dependent. Indicators can include hydric soils map, STATSGO, Imagery, Landform, Soil Survey, topography layers, Photo of soil pit, Local expertise, and ESD. Decision thresholds are the same as those used above for vegetation.

Hydrology. Direct observation or Indirect indicators can provide much information regarding wetland hydrology. In many situations, remote resources can provide a better indicator of the sampling unit's normal hydro pattern than do field indicators. Aerial imagery and associated antecedent precipitation data can be extremely helpful to compare past and current hydro patterns; crop stress, drowned-out plants, standing water, plant specific wetland signatures, and altered patterns in vegetation are all useful indicators of hydrology. Indicators can include Imagery, Landform, Photo, Climate data, Local expertise, and ESD. Decision thresholds are the same as those used above for vegetation.

Step 7. The sampling units are determined to support a prevalence of hydrophytic vegetation, hydric soils, and hydrology indicators. If greater than 50% of the remote resource indicators for each wetland factor are a "yes" and support the prevalence of all three wetland factors, document and record the findings on Form 4, Indicator Threshold and Decision.

Step 8. At least one or more of the wetland factors have not been met and the sampling unit is not a wetland. If the wetland specialist is confident in the result, they will document and record the results according to the NFSAM, State Policy, or as directed by the state resource specialist.

Step 9. Document the decision for the project area on Form 4. Record/delineate sampling units on the wetland plan map in Toolkit; assign Wetland Labels and delineations on the plan map. Record on NRCS-CPA-026e and attach associated documentation as required. If a decision cannot be supported due to inadequate information or questionable indicators (N/A or ?) then an On-Site will be needed. The evaluator may also go to the site to collect more information to confirm an Off-site decision.

Access the COEM and read Subsection 1 – On-site Inspection Unnecessary. After reviewing all available remote sensing data and tools, the wetland specialist determines the sampling unit consists of small ponds that have standing water year round, and are dominanted by plants that have wetland indicator status of obligate and facultative wet. Regarding a simple decision on the prevalence of FSA hydrophytic vegetation:

1. **Is there a reason to go on-site and collect data?**
2. **If the information collected in Step 1 showed the ponds dry during most of the growing season, i.e., they only had standing water in the early spring and late fall, would there be a reason to go on-site and collect data?**
3. **What are indicators for hydric soil in this case?**

Stop Time: _____

Notes:

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Learning Concept 4-2: Design and Application of Sampling Efforts for On-Site Method

- **Understand, design and apply sampling efforts**
- **Recognize the difference between measurement methods**
- **Recognize the difference between the Corps of Engineers 404 Wetland Manual and the National Food Security Act Manual**
- **Understand the On-Site Method**

This Learning Concept is designed to take 30-40 minutes and includes office exercises. Links are provided as optional learning opportunities.

ON-SITE METHOD

The first four steps for the On-Site Method are the same as Off-Site Method: **Step 1 (Preliminary Data Gathering and Synthesis), Step 2 (Identify and Delineate *Sampling Units* on a base map), Step 3 (Determine if the *Sampling Units* support *Normal Circumstances),* and Step 4 (Decide if *Sampling Units* reflect N*ormal Environmental Conditions).*** Once these steps are completed and it is found that normal environmental conditions exist, proceed to **Step 5**. If normal environmental conditions do not exist, the wetland specialist needs to postpone the determination if they cannot make a defendable decision.

Step 5. Designing a Sampling Effort for each Sampling Unit. This is one of the most important steps in the On-Site Method and will be discussed at length.

Clear identification of sampling objectives is critical for selecting an appropriate sampling method. Each sampling unit may have more than one *sampling effort* depending on the size and complexity of the project area. A *sampling effort* is a single data collection effort using plot-less methods, plot-based methods, or line-transects methods. A field data form must be completed for each *sampling effort*. It is up to the wetland specialist to decide which sampling effort will be utilized. Species composition, diversity, richness, age, and structure are considered in this process. Again, the purpose of delineating the project into different *sampling units* is to reduce the variability in data obtained; thereby, increasing confidence that the data, and ultimately the decision, is reflective of the unit as a whole. For FSA determinations, *sampling units* will be selected based initially on the plant community. It is the responsibility of the wetland specialist to design the sampling effort. After the sampling effort has been designed proceed to **Step 6.**

Why is this important to me? Plants are a key component of most wetlands and provide many important ecological functions. Some plant species occur only in wetlands; others can occur in a gradient from wetland to non-wetland types. The delineation methods currently accepted by the COEM and the NSFAM, place an emphasis on characterizing the prevalence of plant species. Prevalence has been defined as the number and size of spaces inhabited by an organism; abundance is defined as the number of individuals or shoots of a species (taxon) in a particular area. The purpose of the project often drive many of the critical sampling decisions such as plot size, plot shape, and minimum number of sampling unites required to achieve a desired level of accuracy and precision. In most cases in Alaska, the sampling effort will normally consist of only one sampling strategy and many times,

only include one sampling unit. For example, the site in question may be a pasture which will be assigned one Wetland Label.

Access the COEM and read the flexibility discussion in Part 1: Introduction. What is the difference between the Off-Site Method and the On-Site Method? Who makes the decision as to what method to use and how to sample the vegetation? Why is this important? How different is the COEM from FSA?

Plot-Less or Distance Methods are used by NRCS, the COE, EPA, and private consultants for conducting on-site, routine wetland determinations and delineations. The term plot-less is somewhat of a misnomer as there is a boundary; the *sampling effort* represents an area that does not have a predetermined size or shape. Rather, the boundary varies according to the area which the data represents. The boundaries are determined visually, except in situations where a single *sampling effort* represents an entire *sampling unit*. In this case, the effort represents the entire unit (the most frequently used in Alaska situations). If more than one *sampling effort* is undertaken in a *sampling unit*, then the *sampling unit* should be divided into sub-units so the data can be linked to a particular portion of the unit. There are two methods to collect data using plot-less methods:

1. Meandering Survey Method involves conducting a reconnaissance of the sampling unit or portion of a unit being represented by the data. The reconnaissance does not follow any fixed bearing, but rather the delineator meanders thru the site taking note of the plant community, and the
2. Fixed Survey Method where the delineator stands at a fixed point and observes the sampling unit, or portion of the unit being represented by the data collected. The observation point should be indentified on the base map. This is probably the most used with the soil pit dug at the "fixed point".

For both methods, data are gathered across the entire plant community (or the portion of the plant community being characterized) using visual estimates. A visual estimation of percent cover is made for each species that occurs within the area being represented by the data. Plot-less methods are most commonly applied to *sampling units* that:

- ✓ are obvious wetland or not wetland,
- ✓ are small and readily observed
- ✓ support monotypic or low species richness
- ✓ have moderate to high species richness (many different plant species), but all species are well distributed across the entire *sampling unit* (high species diversity).
- ✓ have few micro-topographic features, or
- ✓ are within a project (or portion of the project) where minimal documentation is needed to meet the needs of the program participant and NRCS.

Plot-Based Methods typically are used to sample vegetation when conducting wetland determinations. They generally consist of one or combination of the following configurations:

1. Standard Plot Size: Plot size, number, and shape are predetermined and are typically based on a guidance document (i.e. Regional Supplements, 1987 Manual). Standard plots work well for larger sampling units with less variability in topography (macro-topography), particularly for site with high species richness but low species diversity (poorly distributed).
2. Graduated Plot Size: Plot size and shape vary depending on the site characteristics. This method is best suited to sites that have abrupt changes in topography, where the sampling units are narrow and wide or of odd shape and size.
3. Nested Plots: Nested Plots have Standard Plot Size but have "sub-plots" for a single stratum. This methods works particularly well for sites with a sparse over-story, but with a dense highly-diverse understory (i.e. alpine tundra). It is also useful when the over story is monotypic, but the understory is highly rich but of low diversity (not well distributed).

Although the size and shape of any sampling effort can vary depending on the site conditions and purpose of the determination, each sampling effort (plot-less, plot-based, and sub-plots) has a defined dimension. Plot-methods differ from plot-less methods, as they always have a "plot-center". The size and shape of the plot is tailored to the physical attributes of the community being characterized balanced with the purpose of the request.

The plot-based method and sampling intensity shall be such that the plant community being assessed (*sampling unit*) is well represented by the data. Sparsely vegetated sites might require larger plot size or more plots than densely vegetated sites. Monotypic sites will typically require smaller plots and/or fewer plots than will sites with greater species richness, particularly if the species diversity is low.

As discussed in preceding sections, the plot center is located within the *sampling unit* at a landscape position that is representative of the target community. The exception to this is the use of the **Complex Method** (refer to the *Identification of Sampling Units* section of the NFSAM appendix).

Plot-based methods are more typically applied to *sampling units* that:

- are saturated or inundated on an ephemeral or seasonal basis
- are large or have limited visibility
- have a high level of species richness but low level of species diversity
- commonly have micro-topographic features, and/or
- are within a project that might require more data collection, future site visits, or significant defense of the decision.

Line-Transect Methods are rarely appropriate for FSA wetland determinations due to extensive data collection requirements. However, there are unique situations such as a potential challenge to a wetland call or there are unique and sensitive habitats within the project area, where these methods may be appropriate. The two line-transect methods are:

1. Point-Intercept Methods are beneficial because the data are collected and estimates are not used. The plot-less methods and plot-based methods presented by the COE all rely on visual estimates. Point-intercept methods collect data at each point. Thus, the data can be replicated by anyone, regardless of their training level or personal bias.
2. The SCS Method is limited to unique projects requiring the most extensive data collection and most detailed data analysis (refer to the NFSAM for more information on this method).

Regardless of the sampling method selected, the intensity of sampling (number of data points, plot size, and data point distribution, transect length) can be modified based on site conditions and the purpose of the delineation. FSA wetland determinations are made for the entire *sampling unit*, rather than for a *sampling effort* (i.e. plot). It is, therefore, appropriate to use different sampling methods for different *sampling units* within the project area, but only one method will be used within a single *sampling unit*.

FSA wetland determinations are made at the *sampling unit* scale. It is understood that areas considered wetland under the FSA may contain small dissimilar areas not sampled (hence the statutory and regulatory phrases *predominance of hydric soil* and *prevalence of hydrophytic vegetation).* For these reasons, vegetative sampling along the boundary between two *sampling units* is usually avoided, as the conditions along the boundary are seldom representative of either unit being characterized. If, however, this transition zone is particularly wide and/or the project warrants a more a detailed delineation, then the sampling strategy might be modified to consider the transition zone as a separate *sampling unit*. By separating this area into an individual unit, the variability of data is narrowed and confidence is thereby increase. The decision of increasing the number of *sampling units* is best reserved for after larger units are sampled and decisions rendered; as the increased data collection requirements (staff time) is best reserved for units adjacent to the wetland boundary rather than units well within or outside the wetland. For additional information on sampling methods refer to the Alaska SharePoint Site.

Refer to the COEM and find the Routine, Level 2 – Areas Equal to or Less than 5 Acres in Size. Read about this method as it relates to designing a sampling effort. In addition, locate your regional supplement to the COE Manual. Is there a difference in the methodology? Are they the same? Does NRCS only conduct wetlands within a project area if they are under 5 Acres in Size? What happens if a project area is 10 Acres in Size? Where do you go to find this information?

Step 6. Stratification of vegetation for sampling. Once the sampling effort has been chosen, the vegetation within the *sampling unit* is sampled. Vegetation strata help facilitate plant sampling and ensure that plants of all sizes are considered in the hydrophytic vegetation determination. The structure of vegetation varies greatly in wetland communities across the country. Throughout much of Alaska, short-statured woody plants and bryophytes are functionally important in many plant communities such as bogs, fens, and tundra wetlands. The following strata are used in Alaska:

1. **Herb:** all herbaceous (non-woody) plants including herbaceous regardless of size
2. **Sapling/Shrub:** woody plants <3 inches DBH (diameter at breast height) regardless of height
3. **Tree:** woody plants $\geq$ 3 inches DBH, regardless of height

If a plot method is used the corresponding plot measurements and plot sizes for each strata are:

	Measurements	Plot sizes
Herb	Canopy Cover	1-$m^{2,}$ 5-foot radius or 8 x 1m^2 nested plots
Sapling/Shrub	Canopy Cover	5,10,15 or 30-foot radius plots
Tree	Canopy Cover and/or DBH	30-foot radius plots

The two most common metrics used to evaluate plant species dominance are *frequency* and *cover:*

1. *Frequency* refers to the probability of detecting a species in a randomly placed sampling unit (e.g. point, transect) in a particular area. Frequency is typically expressed as a percent of the total number of observations, calculated either within a sampling unit such as a plot or among sampling units.
2. *Canopy cover* is defined as the area of ground covered by the vertical projection of the areal parts of the plants. Small openings within the crowns and gaps are included (as opposed to *foliar cover*) and overlap of plant species occurs which can result with total canopy cover over 100%. This is referred to as absolute cover. Relative cover always equals 100%. Canopy cover is visually estimated for each plant species in the sampling effort.

Canopy cover is the metric used in Alaska for evaluating abundance. For the field exercise, visually estimating each species by percent canopy cover will be done. However, in measuring and characterizing the abundance of trees, basal area can be used either as an alternative metric or used to supplement canopy cover. Direct measurements are typically made using diameter tapes. Basal area can also be used indirectly to determine which trees are sampled with the use of an angle gauge or basal area prism. Basal area data can be used to test for the presence of hydrophytic vegetation using the dominance ratio approach, but it cannot be used to calculate a prevalence index, which requires absolute cover data for all species in each stratum.

Once the vegetation has been sampled, plant species and associated wetland indicator status assigned and recorded for each sampling effort within each sampling unit, the next step is to determine whether or not the sampling units have a prevalence of hydrophytic vegetation, hydric soils, and hydrology. Proceed to **Step 7, Learning Concept 4-3: COE Indicators for determining a Prevalence of Hydrophytic Vegetation.**

Refer to the COEM and the Regional Supplement. After reviewing the information collected for the project and completing Steps 1-6, five sampling units have been delineated. Three are forested and two are non forested riparian areas. How would you:

- **Design your sampling effort?**
- **If you decided to employ a Plot-Based method, what plot configuration would you use? Why?**

In Table 1 of the Corps Supplements (Chapter 1), the Corps provides for what parts of the 1987 manual are replaced by the supplements. If you are unfamiliar with Table 1, you will want to access it before moving to the next discussion. The sampling methods described in Routine Greater Than and Less Than 5-acres are **NOT replaced** by the sampling methods presented in the supplements. Based on the flexibility options provided in the 1987 Manual, the vegetative sampling method described in the supplements **can be used in lieu of those in the Manual** - base on the sole judgment of the agency expert. This is likely the most misunderstood concept presented in the supplements –***the sampling methods presented do not replace those in the Corps Methods***.

Also, some data analysis methods are specifically linked to a particular sampling method, while others can be applied to data obtained from any sampling method. It is very important for the wetland specialist to accurately sample and characterize the vegetation within the sampling units in order to make a decision if hydrophytic vegetation is dominant. There are many references available to assist the wetland specialist in designing the appropriate sampling method and it is the responsibility of the wetland specialist to work with the planner to apply the correct sampling design for the purpose of the project.

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Learning Concept 4-3: Indicators of a Prevalence of Hydrophytic Vegetation, Step 7

- **Learn how to apply Indicator Methods**
- **Recognize the difference between Indicator Methods**
- **Recognize the difference between the Corps of Engineers 404 Wetland Manual (COEM) and the Regional Supplement**

This Learning Concept is designed to take 30-45 minutes and includes office exercises. Links are provided as optional learning opportunities.

Step 7. Data Analysis. Each regional supplement to the COE Manual provides two to three COE indicators of a prevalence of hydrophytic vegetation. The indicators are:

- Indicator 1: COE 50:20 Rule (Dominance Test)
- Indicator 2: COE Prevalence Index (COE PI)
- Indicator 3: COE Morphological Adaptations

Each indicator has a unique set of advantages and disadvantages (refer to Job Aids on the SharePoint Site). NRCS wetland specialists are directed to select the data analysis indicator that is best suited to the particular situation (site conditions and purpose of the delineation) and follow the regional supplement. If data are acquired from more than one *sampling effort* within a *sampling unit*, an average (arithmetic mean) is obtained from data from all sampling efforts. The exception is when the wetland specialist uses the SCS Line-Transect Method. This method requires that data from each line-transect be compared to data from other transects so a standard deviation can be calculated. The *Morphological Adaptations*, Indicator 3, is only used in rare circumstances (refer to Module 3) and mentioned in some regional supplements such as Alaska. Only the 50:20 Rule (Dominance Test) and the PI (Prevalence Index) will be discussed here. It is up to the wetland specialist to apply the appropriate data analysis indicator according to the Alaska Supplement. *Note: It is recommended that the wetland specialist apply both Indicator 1 and Indicator 2 for determining dominance.*

If the *sampling unit* is problematic and modification of vegetative sampling and/or data analysis methods fail to provide for a confident and coherent decision, then the use of Off-Site Methods should be considered, or the decision should be delayed until site conditions improve as required by regulation in 7 CFR Part 12; Section 12.6 (c) (7).

If the data sampling and data analysis find that the appropriate decision threshold is not met, AND the results are representative of *normal circumstances* and *normal environment conditions*, AND the wetland specialist is confident in making a decision, then it is suggestive that the *sampling unit* is not a FSA wetland and no further investigation is needed.

If the data analysis supports the prevalence of hydrophytic vegetation for the sampling units under *normal circumstances* and *normal environmental conditions*, or would have supported such vegetation prior to a post-1985 alteration, then proceed **Step 8, Learning Concept 4-4, Summary of Making a Decision on the Prevalence of FSA Hydrophytic Vegetation.**

Only a few regional supplements provide for a third indicator of a prevalence of hydrophytic vegetation. Does Alaska? Do they provide for indicator 3: Morphological Adapations? If so, read the concepts and the application until you understand when and how this Corps indicator is applied.

Why is this important to me? Decisions are rendered based primarily on predetermined decision thresholds established for the selected data analysis method. The following are the thresholds to be used by NRCS to decide if a *sampling unit* supports a prevalence of hydrophytic vegetation.

- **Indicator 1: COE 50:20 Rule** - Greater than 50% of the dominant species are FAC or wetter (Table 1)
- **Indicator 2: COE Prevalence Index** - A PI score of 3.0 or less. This formula uses canopy cover and indicator status (Table 2)

If any of the thresholds are met, it is suggestive that the sampling unit supports a prevalence of hydrophytic vegetation. Because NRCS makes wetland decisions on data obtained from the entire sampling unit (all sampling efforts), rather than from an individual sampling effort, the COE's procedure has been slightly modified for use by NRCS staff to better meet the FSA wetland definition. Typically, the COE 50/20 Rule is used when data are collected using plot-less methods or plot-based methods; however, data collected from line-transect methods can also be applied to the COE 50/20 Rule. Thus, for FSA purposes the COE 50/20 Rule can be applied to data collected by any method. Regardless of sampling method, decisions of dominance are based on and appropriate dominance measure (i.e. relative cover, absolute cover, dbh, and dominance). Although not required both the 50:20 and the PI should be performed.

Indicator 1: COE 50:20 Rule

Data collection methods are either based on a single layer (i.e. point intercept) or they are stratified (sampling vegetation with different strata). This sounds more complicated than it is. Once you go through the process it will make more sense. Data from both methods can be analyzed using the 50/20 data analysis method. Application of the 50:20 Rule is applied as follows:

- At each individual *sampling effort* (plot-base, plot-less, or line-transect) within a *sampling unit*, determine the dominance (i.e. percent cover, number of stems) of each species by strata.
- Calculate the average dominance of each species among all *sampling efforts* with the *sampling unit*.
- Rank the species in order from highest to lowest dominance. If strata were used, then an individual species occurring as a dominant in more than one stratum may be listed more than once (tree and saplings).
- Sum dominance figures for each plant species from the ranked list until the 50% relative dominance threshold is met (COE regional supplement method) or when the cumulative relative dominance exceeds 50 percent of the total average relative dominance. Select all species that were used to reach a cumulative dominance of more than 50% total average dominance. If two or more species are equal in coverage they are each selected.
- Select any other species that, by itself, is at least 20 percent of the relative dominance (or exceeds the 20% relative threshold (COE method).

The selected plant species are considered to be dominant species occurring within the *sampling unit*.

Table 1. Example of Indicator 1: 50/20 Data Sheet (based on the 1983 List).

Stratum	Species Name	Indicator Status	Percent Cover	Dominant?
Herb	*Matteuccia struthiopteris*	FACW	**40**	Yes
	Impatiens noli-tangere	FACW	**20**	Yes
	Equisetum arvense	FACU	10	No
	Ribes hudsonianum	FAC	10	No
	Thalictrum sparsiflorum	FACU	10	No
	Calamagrostis canadensis	FAC	5	No
	Dryopteris dilatata	FACU	5	No
	Oplopanax horridus	FACU	5	No
	Streptopus amplexifolius	FAC	5	No
	Total Cover 110			
	50/20 Thresholds: 50% of total cover = 55% (.5 x 110 = 55) 20% of total cover = 22% (.2 x 110 =22)			
Sapling/shrub	*Salix alaxensis*	FAC	80	Yes
	Populus balsamifera	FACU	10	No
	Alnus sinuata	FAC	10	No
	Total Cover 100			
	50/20 Thresholds: 50% of total cover = 50% (.5 x 100=50) 20% of total cover = 20% (.2 x 100=20)			
Tree	*Populus balsamifera*	FACU	10	Yes
	50/20 Thresholds: 50% of total cover = 50% (.5 x 10 = 50) 20% of total cover = 20% (.2 x 10 = 2)			
Hydrophytic Vegetation Determination	Total number of dominant species across all strata = 4. Percent of dominant species that are OBL, FACW, or FAC = 3/4 = 75%. Therefore, this community is hydrophytic by Indicator 1 (Dominance Test).			

Note: For the herb strata, there are no species that are greater than 55%. There are only two plant species that are greater than 22%. For the Sapling/shrub, there is one species greater than 50% and 20%. For the Tree strata, there are no species greater than 50% and there is only one species greater than 2%.

In most situations, the emphasis of using only dominant species to base a decision is an ecologically sound concept, as by definition non-hydrophytic species (FACU) commonly occur in wetlands and some hydrophytes (FACW) commonly occur in non-wetlands. But seldom do these species dominate landscape positions which they are less adapted. Because the COE's 50/20 rule is ecologically valid for an array of situations and is the most easily applied data analysis method, it has become the most commonly applied data analysis method used to base decisions. It is particularly useful in situations where:

- The hydrology of the assessment area has been only minimally affected by past on-site or off-site actions,
- The community is dominated by primarily FACW and OBL species or FACU and UPL species, and/or
- Many different species are selected as dominant species.

Indicator 1: Exercise. These type of concepts are difficult to understand without practice. Take a moment to access the Alaska Regional Supplement at:

Wetlands>Policy_Procedures_Manuals…>Manuals_Guidance_Procedures>AK Supplement to the COE Wetland Delineation Manual

Read about Indicator 1 (Dominance Test). Study the example in Table 1 above. After you think that you understand the concepts, play with the example by taking away one or more species and/or changing the percent covers. With this new example (based on your modification of the example), see if you can decide if Indiator 1 is met. Do not move to the next discussion, until you have an understanding of :

- **How to decide if a species is a dominant (using 50% and/or 20%)**
- **How to decide if the plant community is hydrophytic.**

Indicator 2: Prevalence Index

Typically, the COE PI method is applied to data obtained from visual estimates of percent cover (plot or plot-less methods); however it can be applied equally well to count (i.e. transect) data. At least **80% of the plants** must be assigned an indicator status. The same data that is used in the Dominance Test can be used for the Prevalence Test. This is a more sensitive (and time intensive) approach that uses all species weighted by percent cover. Note that species are not separated by strata for the PI.

Some studies have found that the results of from the application of PI better align with hydric soil indicators and or wetland hydrology than do the results of the application of the Dominance Test (Dewey et. al 1996, Wakeley et. al. 1996). In a study of sites across the U.S., Wakeley and Lickvar (1997) found a disagreement at a rate of 16% when the two methods are applied to the same site data.

If more than one *sampling effort* is used, the data can be averaged before being applied to the PI formula or the process can be conducted for each *sampling effort* then an arithmetic mean PI can be calculated determined for the entire unit. Regardless, a single PI is obtained for the entire *sampling unit*. The PI formula is as follows.

$$PI = \frac{(A)_{OBL} + 2(A)_{FACW} + 3(A)_{FAC} + 4(A)_{FACU} + 5\,(A)_{UPL}}{A_{OBL} + A_{FACW} + A_{FAC} + A_{FACU} + A_{UPL}}$$

Where:

PI= Prevalence Index

A_{OBL} = Summed percent cover values of OBL plants

A_{FACW} = Summed percent cover values of FACW plants

A_{FAC} = Summed percent cover values of FAC plants

A_{FACU} = Summed percent cover values of FACW plants

A_{UPL} = Summed percent cover values of UPL plants

The prevalence index should range between 1 and 5. See Table 2 for an example calculation of the prevalence index using the same data as in Table 2.

Table 2. Example of the prevalence index using the same data as in Table 1.

Indicator Status Group	Species Name	Percent Cover by Species	Total Cover by Group	Multiply by:1	Product
OBL species	None	0	0	1	0
FACW species	*Matteuccia struthiopteris* *Impatiens noli-tangere*	40 20	60	2	120
FAC species	*Ribes hudsonianum* *Calamagrostis canadensis* *Streptopus amplexifolius* *Salix alaxensis* *Alnus sinuata*	10 5 5 80 10	110	3	330
FACU species	*Equisetum arvense* *Thalictrum sparsiflorum* *Dryopteris dilatata* *Oplopanax horridus* *Populus balsamifera*2	10 10 5 5 20	50	4	200
UPL species	None	0	0	5	0
Sum			220 (A)		650 (B)
Hydrophytic Vegetation Determination		Prevalence Index = B/A = 650/220 = 2.95 Therefore, this community is hydrophytic			

Indicator 2: Exercise. Once you feel comfortable with Indicator 1 read the discussion under Indicator 2 - the Prevalence Index procedure. Refer to the example in Table 2 (or refer to the vegetation section of the supplement). After you master the concept in the example, manipulate the data in Table 2 (change percent cover and or drop some species). Play with this to see how different changes in the data change the PI. Note that as the findings deviate from a 3.0 (approaches a 1.0), the data is providing more confidence that under NC and NEC the site would support plants growing in water or an anaerobic substrate. As the PI approaches 5.0, the confidence is greater that the vegetative data are obviously indicating not hydrophytic. The decision threshold is at 3.0.

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Learning Concept 4-4: Making a Decision on the Prevalence of FSA Hydrophytic Vegetation, Step 8

- **Making a Decision on prevalence**

_____ This Learning Concept is designed to take 15 minutes and includes office exercises.

Step 8. **It is determined that the *sampling unit* is dominated by hydrophytic vegetation.** Document the vegetation section of the field form for each sampling unit accordingly. Proceed to document the other two wetland factors, hydric soils and hydrology following the process in the COEM and the Alaska Supplement. It is recommended that a GPS point be taken at the soil pit.

Why is this important to me? Once the sampling strategy has been selected for vegetation, application of the indicators or direct observation of soils and hydrology can be implemented. A soil pit is dug in the center of the sampling unit and the indicators recorded (refer to the Hydric Soil Indicators in Module 3). The student is now directed to the COEM and the Alaska Supplement for documenting Hydric Soil indicators and Hydrological indicators.

Step 9. After a sampling unit (or effort) has been determined to be a wetland, the next step is to assign a wetland label and delineate by using the GPS track function for each wetland label. In Toolkit, develop a wetland layer and download the GPS points. Assign the wetland label. A final wetland plan map can be attached to the NRCS-CPA-026e.

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Learning Concept 4-5: Knowledge Assessment - Field Exercise

Once you have completed PHASE 1 you will be ready to attend the PHASE 2 FIELD EXERCISE. During Phase 2 you will have the opportunity to apply the information you have learned in Phase 1. Using this training module, the Corps Manual, the Alaska Plant List, and Alaska Regional Supplement, you will have the opportunity to collect vegetation, soils, and hydrology information. It is also recommended, to practice an ON-SITE determination prior to attending the field exercise, if at all possible.

For Phase 2 Training please bring the following information:

Alaska Wetland Plant List, Alaska Regional Supplement, Corps of Engineers Wetland Manual

Field Equipment: (refer to equipment list on SharePoint site) Munsell Soil Color Book, Clipboard with a dozen wetland on-site field data forms, field vest and/or field pack, measuring tape, clinometers, flagging; pens/pencils; calculator, etc. NOTE: shovels/sharpshooters will be provided. There will be an equipment list posted on the Alaska Share Point Site > Wetlands.

Be prepared to out into the field!

OFF-SITE DATA SOURCE ELEMENTS: Go through the OFF-SITE procedures to collect data about NEC. Bring this information with you for Phase 2. More information will be provided on the sites as we get closer to the training date.

Completion of PHASE 1 is required prior to attending PHASE 2.

End of Activity for PHASE 1