Field Method for Identifying Wetlands and Their Boundaries

CHAPTER 5

This chapter outlines the field method for identifying wetlands in accordance with Part 303. The field method requires an understanding of the information provided in the previous chapters on wetland hydrology, wetland vegetation and aquatic life, and wetland soils. The field method encompasses preliminary data collection and analysis prior to visiting the site, the on-site process of determining whether wetland hydrology and a predominance of wetland vegetation or aquatic life exists, and the establishment of a **wetland boundary** if the site contains wetland. This chapter also discusses options for documentation of site conditions and findings.

The specific parameters required in identifying a wetland as defined in Part 303 are the predominance of hydrophytic plant species or aquatic life, and the existence of wetland hydrology. Although site characteristics may vary in different environments across the state, the interpretation of the parameters and the application of this method should remain constant.

The field method described in this chapter is designed for use by MDEQ staff. The need for a high level of experience and a broad understanding of wetland conditions, in order to apply this method correctly, cannot be overemphasized. At a minimum, the user must be able to: (1) identify the dominant plant species in the area; (2) recognize hydrologic processes and the characteristics of hydric soils; and (3) apply basic ecological and sampling techniques.

The user of this method must be able to recognize wetland plant species and wetland hydrology throughout the growing season. In addition, wetland plant species may be more abundant at certain times of the year and seasonal conditions should be taken into consideration.

Application of the methods presented in this manual may be tailored to meet site specific requirements. Much of the technical information in this chapter has been adapted from the 1987 USACE Wetlands Delineation Manual. However, the 1987 USACE Manual allows for more extensive documentation of site characteristics and conditions beyond that necessary to make routine wetland identifications for the purpose of meeting the definition in Part 303.

The method described in this chapter is for routine applications where normal circumstances exist. The information and methods outlined in Chapter 6 describe alternative approaches that can be used for sites with non-normal site conditions.

The user may consider use of the Comprehensive Determination Procedure provided in the 1987 USACE Wetlands Delineation Manual for situations in which wetlands are difficult to identify or require more extensive documentation than outlined in this field method. Use of methods such as the Comprehensive Determination Procedure, in addition to or in lieu of the method described in this chapter, assumes that the user understands how to properly evaluate the vegetation and hydrologic information obtained in reference to the definition of wetland as provided in Part 303. The USACE's Comprehensive Determination Procedure should only be used by experienced users.

A. Information Sources

This section discusses potential sources of information that may be helpful in identifying wetlands and wetland boundaries. A preliminary analysis of what to expect on site is critical for an informed and efficient application of this field method. The information sources discussed below should be examined by the user in order to provide an understanding of the natural conditions of the site and data for Steps 1 and 2 of this field method. Specifically, these information sources assist in:

- Estimating the size of the site.
- Determining the time required to complete the evaluation.
- Determining expected characteristics of the soil profiles and hydrology of the site.
- Determining expected wetland types on the site.
- Selecting the most likely point from which to start the procedure.

The list of information sources discussed below is not intended to be exclusive of other available information sources. Various regions of the state have been studied more extensively than others, and therefore, more information is available. Constructive use of these sources will depend on the source of the information and how familiar the user is with the particular site. Not all information sources are applicable to a given situation.

The following information sources are considered useful because they can provide information directly related to the interpretation of site conditions and are readily available for most areas of the state. The user should obtain the following information when available and applicable:

1. Quadrangle Maps, U.S. Geological Survey (USGS)

USGS quadrangle maps are available at different scales from the MDEQ Geological Survey Division, the Michigan United Conservation Clubs, and some municipal and commercial sources. The most recent USGS maps should be used, which are at a scale of 1:24,000 or better. These maps provide important information to aid in locating the site and determining expected site characteristics. Information shown on quadrangle maps include:

a. Landmark features such as towns, roads, bridges, streams, buildings, cemeteries, water bodies, etc., that are not commonly found on road maps.

b. Topographic lines that indicate elevations and drainage patterns.

c. General indications of wet areas (swamps and marshes). Note: These areas should not be used as wetland boundaries.

d. Latitude, longitude, townships, ranges, and sections. These provide geographic descriptions of the area.

e. Directions, including both true and magnetic north.

2. National Wetlands Inventory (NWI) Maps, U.S. Fish and Wildlife Service (USFWS)

The NWI maps were produced by interpreting aerial photography taken between 1975 and 1983, at either a 1:24,000 or 1:62,500 scale, and overlaying the results on USGS quadrangle maps. The NWI maps identify wetland and open water areas located within the map area, describe the water regime, and classify the wetland type (Figure 5.1). The NWI maps are most often used to show the approximate extent of a wetland and its association with other wetland and non-wetland areas. NWI maps are available from the USGS Earth Science Information Center in Reston, Virginia.

Figure 5.1 - Example of a NWI Map

Due to the scale of the aerial photography used, the fact that mapped areas have not been field-verified, and other factors, NWI map boundaries are approximate and cannot be used as the basis for determining whether a wetland exists or not at a particular location. For example, temporarily or intermittently

flooded wetland areas are very difficult to map accurately from aerial photography and may not appear on a NWI map. In addition, farmed wetlands are not generally identified on NWI maps.

3. Michigan Resource Information System (MIRIS) Land Use Inventory, Michigan Department of Natural Resources (MDNR)

The Current Use Inventory maps have been compiled by the MDNR Michigan Inventory Program based on interpretation of aerial photography taken in 1978 and 1979. MIRIS maps are available at a scale of 1:24,000 on a county-by-county basis from local planning departments. The maps inventory 60 different land use classifications of which approximately one-sixth relate to wetland types (Figure 5.2).

The wetland boundaries on MIRIS maps identify approximate boundaries that have not been field verified for accuracy. In addition, not all wetland boundaries are included on the maps. Many wetland areas smaller than 2.5 acres in size, particularly those within developed areas, are not shown. Wetland areas which are currently farmed, or which have been in agricultural production in the recent past, are also not generally identified on MIRIS maps.

4. Remote Sensing Data

Remote sensing data can be useful sources of information available for wetland identification. Recent aerial photography, particularly color infrared, can provide a detailed view of an area. Recent land use and other features (e.g., general vegetation types, spatial extent of plant communities and degree of inundation of the area when the photography was taken) can be determined. Aerial photographs are particularly useful in identifying water features and patterns of plant communities and any abrupt changes in those communities. County NRCS offices, Farm Service Agency offices, and other county planning or municipal offices can provide aerial photographs that vary in scale and degree of print quality. Sources such as digital aerial photography and satellite imagery are not as readily available to the public, are often available at smaller scales, and require sophisticated equipment and training for correct interpretation of the data.

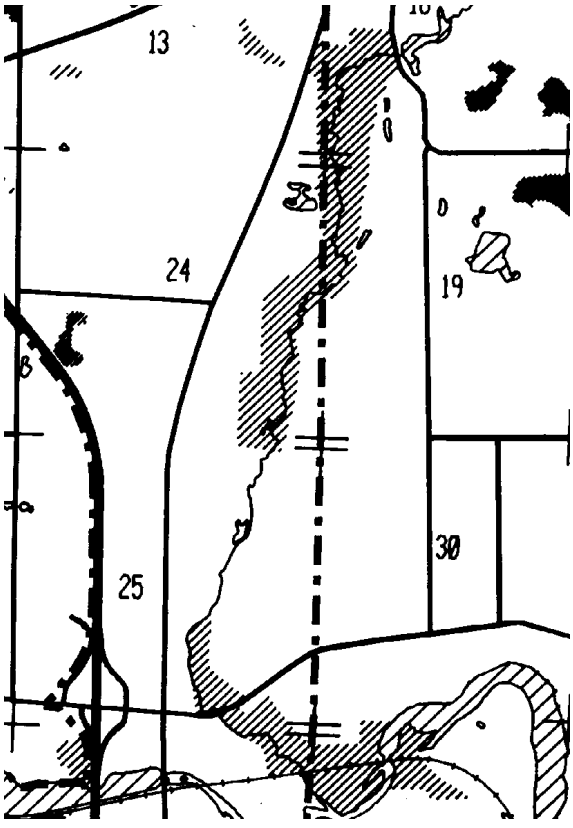


Figure 5.2 - Example of a MIRIS Map

5. Soil Surveys, U.S. Natural Resources Conservation Services (NRCS)

Soil surveys are developed by the NRCS on a county-by-county basis. Soil surveys are available for most counties in Michigan from NRCS county offices. If a soil survey is not available for a particular county, ask the county NRCS office whether the soils have been mapped and copies are available. Soil surveys contain several types of information (Figure 5.3), including:

Figure 5.3 - Example of a Soil Survey

a. General information (e.g. climate, settlement, natural resources, farming, geology, and general vegetation types).

b. Uses and management of soil, including any mention of wetness characteristics of soils.

c. Soil properties. Soil and water features are provided that may be very helpful for wetland identifications. Frequency, duration, and timing of inundation (when present) are described for each soil type. Water table characteristics that provide valuable information about soil saturation are also described. Soil suitability ratings and permeability coefficients may also be available.

d. Soil description. Soils are classified and described, and includes a representative soil profile for each **soil series**.

It is important to note that many non-hydric soil types contain small areas of hydric soils, or hydric inclusions. Therefore, it is important to read the soil series descriptions for each soil type mapped on the area to be evaluated. Only soil types that are three acres in size or larger are mapped in the soil surveys. Areas less than three acres in size are only referenced as inclusions.

6. Hydric Soils List, NRCS

The NRCS, in cooperation with the NTCHS, has compiled a list of hydric soils of the state of Michigan. As discussed in Chapter 4, the list of hydric soils was created using the hydric soil criteria developed by the NTCHS. The hydric soils list of the state of Michigan contains only those soil series mapped in published county soil surveys. As additional county soil surveys are published, any additional soils will be added to the hydric soils list.

Lists of hydric soils for the state or a particular county or locality are available from county NRCS offices. The county soil lists are preferred for making hydric soil decisions as they contain the soil series on the national list as well as wet miscellaneous areas (e.g. marsh, swamp), wet soils classified at higher level than the series, smaller map units, and map units that potentially contain hydric soil inclusions.

MDEQ staff should insert the list of hydric soils for those counties in which they work in Appendix E of this manual. The list should be used in conjunction with the soil surveys to locate areas where hydric soils exist. These soils, once identified and confirmed in the field, can help determine if there is wetland hydrology in the area.

7. Recorded Hydrologic Data

Potential Information Sources:

1. *USGS Quadrangle Maps*
2. *USFWS NWI Maps*
3. *MDNR MIRIS Maps*
4. *Remote Sensing Data*
5. *NRCS Soil Surveys*
6. *NRCS Hydric Soils Lists*
7. *Recorded Hydrologic Data*

Recorded hydrologic data is often available and can assist in the evaluation for the potential presence or absence of wetland conditions. Recorded data may include stream gauge data, lake gauge data, flood predictions, and historical records. Use of these data is commonly limited to areas adjacent to streams or other similar areas. Recorded data usually provide short- and long-term information about frequency and duration of inundation, but contain little or no information on soil saturation which must be gained from soil surveys or other similar sources.

B. Field Method

Application of the method provided in this chapter is for routine **wetland identifications**. The method may be tailored to meet site-specific requirements, especially with respect to sampling design.

Step 1: Off-site Information Review

Use the information sources previously described, as well as other available information sources, to complete the following steps for locating and gathering information about the site:

1A. Locate the site to be evaluated and develop a base map.

Determine and mark the boundaries of the site using a map prepared by a registered land surveyor, a USGS map, a project contour map, an aerial photograph, blueprint, or a detailed sketch map that shows the prominent landscape features (e.g., roads, buildings, drainage patterns, vegetation, etc.). The appropriateness of these sources for base maps will depend on the size and complexity of the area to be evaluated.

Point Determination Method

Steps

Step 1: Off-site Information Review
1A. Locate the site to be evaluated and develop a base map.
1B. Estimate the size of the site.
1C. Summarize available information about the site.

Step 2: On-site Preliminary Reconnaissance
2A. Identify potential wetland areas.
2B. Determine if normal circumstances exist.
2C. Evaluate hydrologic and vegetative patterns on site.
2D. Determine whether further evaluation is needed.

Step 3: Choose a potential wetland area to begin evaluation

Step 4: Point Determination Method
4A. Determine whether a predominance of wetland vegetation is present.
4B. Determine whether visual evidence of wetland hydrology is present.
4C. Determine whether hydric soils are present.
4D. If starting point does not have indicators of wetland hydrology, repeat Steps 4A through 4C at other points along the transition zone.

Step 5: Identifying the Wetland Boundary

Step 6: Documentation of Wetland Conditions

1B. Estimate the size of the site.

Measure the boundaries and calculate the size of the site on the base map. With experience, the user can begin to predict the amount of time required to complete the field procedures based on anticipated conditions such as the complexity and size of potential wetland areas.

1C. Summarize available information about the site.

Examine available information sources, such as the sources previously described and any available previous studies of the area, which may help in making a preliminary analysis of site information. Identification of a wetland and location of its boundaries cannot be made solely from this preliminary information; field verification of the information during the on-site evaluation is necessary.

The USGS quadrangle maps are very useful in defining the site's probable landscape setting and surrounding influences. The maps include obvious low-lying areas and areas the USGS has designated

as marsh or swamp. However, because wetlands do not necessarily occur in low-lying areas, and wetland edges may or may not follow topographic contours, the wetland boundaries should not be interpreted from office topographic information alone. The user should note:

- What the site is mapped as (e.g. floodplain area, isolated depression, ridge and swale, marsh, swamp)
- Various indicators of hydrology (e.g. streams, rivers, lakes, ponds) and drainage patterns.
- Changes in **topography** or elevation.

The NWI and MIRIS maps can provide outlines of potential wetland areas that will require detailed on-site examination. If aerial photographs are available, they should be used in conjunction with the aforementioned information sources to identify potential wetland areas. In cases of large or controversial sites, or sites where normal circumstances do not exist, it is recommended that the assistance of an expert in aerial photo interpretation be obtained.

It is very helpful to know the soil series and geographic boundary of each soil series on the particular site. The soil survey should be used to estimate the depth to the seasonal high water table, frequency, duration and timeframes for flooding, and the suitability for wetland plants and wildlife for each soil type. Recorded hydrologic data, from sources other then the soil survey, can also be used to provide information about frequency and duration of inundation on site. The descriptions of soil series from the soil survey should also be reviewed to identify the drainage classification (i.e. very poorly drained, poorly drained, somewhat poorly drained, etc.) and whether hydric soil inclusions are present. The list of hydric soils should then be examined to determine whether each soil type present on the site is considered hydric, non-hydric with hydric inclusions, or completely non-hydric. Any area containing hydric soil types or that has hydric inclusions should be examined in detail during the on-site investigation.

Soil surveys can be particularly important in identifying potential wetland areas when the site has been recently or severely disturbed, such as on agricultural lands. In farmed or recently farmed areas, typical wetland vegetation may be absent, and these areas are not generally identified as wetland on NWI or MIRIS maps.

Step 1: Off-site Information Review

1A. Locate the site to be evaluated and develop a base map.
1B. Estimate the size of the site.
1C. Summarize available information about the site.

Areas identified on maps, aerial photos, soil surveys, or other information sources as having the potential to have wetland hydrology, wetland soils, or wetland vegetation may need special attention during the on-site inspection. Areas identified as potential wetland on the information sources, and the transition zones around them, will likely require detailed on-site examination.

Step 2: On-Site Preliminary Reconnaissance

This step and subsequent steps are done on-site. Before arriving on-site, make certain that permission to access the site and conduct the evaluation has been obtained. If adjacent properties need to be accessed for purposes of identifying off-site conditions which are impacting the site in question, make sure that permission to access other sites has also been obtained. Equipment and materials that may prove useful for the evaluation include:

- Base map with the particular site located on the map
- Data Report Form (Appendix G)
- Michigan Wetland Plant List (Appendix D)
- Michigan Hydric Soils County List (Appendix E)
- Soil Survey
- Soil auger or spade
- Munsell Soil Color Charts
- Plant taxonomic keys
- Compass

2A. Identify potential wetland areas.

Walk the site and verify or update the information acquired from the Information Review in Step 1. The information provided from Step 1, in most cases, will not highlight all potential wetland areas. Therefore, it is essential that the user do a thorough on-site evaluation. All areas of the site should be covered to verify the information from Step 1 and identify other potential wetland areas. The product of this preliminary analysis should be a general understanding of where wetlands are, or potentially are, on the site so that they can be further reviewed in the next step.

2B. Determine if normal circumstances exist.

Identify natural and/or human-induced conditions or impacts that may have affected the site hydrology, vegetation and/or soils. Such impacts include, but are not limited to, channelization, any type of surface water or groundwater diversion, removal of soil or vegetation, placement or removal of agricultural tiles, and material dumped. Also identify any off-site modifications that may affect hydrology of the particular area.

Determine whether the site conditions allow for application of the routine procedure outlined in this chapter. Methods for situations where normal circumstances do not exist are outlined in Chapter 6. The information in Chapter 6 should only be used after it has been determined that positive indicators of wetland vegetation and/or hydrology, including soils cannot be identified due to non-normal site conditions.

2C. Evaluate hydrologic and vegetative patterns on site.

Based upon information collected in Step 1 and visual observation of site conditions, gain an overall understanding of the hydrologic and vegetation patterns of the site.

1. Locate indicators of hydrology (e.g., streams, rivers, lakes, ponds) and drainage patterns.

2. Describe the diversity of **plant community** types (e.g., emergent, scrub/shrub, open fields, forest, etc.) and species composition for each community type.

3. Note all areas that are obviously wetland and non-wetland.

4. Estimate the approximate wetland boundaries by identifying the transitional vegetation zones and looking at the topography.

Step 2: On-site Preliminary Reconnaissance

2A. Identify potential wetland areas.
2B. Determine if normal circumstances exist.
2C. Evaluate hydrologic and vegetative patterns on site.
2D. Determine whether further evaluation is needed.

2D. Determine whether further evaluation is needed.

Determine whether it is necessary to proceed with the wetland evaluation or whether a decision can be made at this point that wetlands exist or do not exist on the site. Based on the information from the preliminary analysis, the user may conclude that no further evaluation is necessary if it is obvious that there is no wetland on the site, or the wetland may be so clearly identifiable that additional evaluation is unnecessary.

Step 3: Choose a Potential Wetland Area to Begin.

Identify obvious wetland and non-wetland areas and then locate the **transition zones** between them. The location of these transition zones is based on the identification of obvious wetland and non-wetland plant communities and on changes in hydrology. For example, the area between a low-lying cattail marsh (mapped as having hydric soils) and a non-wetland beech/sugar maple complex (mapped as having non-hydric mineral soils) should be identified as a transition zone.

Step 3: Choose a potential wetland area to begin evaluation

Some sites may contain wetlands that have transition zones which are difficult to identify. These sites may have no easily discernible wetland or non-wetland areas to use as reference. These sites must be traversed thoroughly to identify an area that appears most likely to be a wetland area in order to establish a starting point. That point should be evaluated, and if wetland conditions are present, the extent of the wetland area beyond that point is identified using the method outlined below.

Step 4: Point Determination Method

Once a transition zone between an obvious wetland and an obvious non-wetland has been identified, the user should identify a starting point within the transition zone in order to determine the boundary between wetland and non-wetland areas. This is done by locating and evaluating specific observation points within this transition zone, in sufficient numbers, to allow identification of a wetland/non-wetland boundary.

4A. Determine whether a predominance of wetland vegetation is present.

1. At the observation point, examine the vegetation by visually scanning the plant community and determining the dominant species in each **vegetation layer** (understory, shrub, and overstory) by visual estimates or sampling (Figure 5.4). The dominant plant species are those that rank as the most abundant or important species present within the area being evaluated.

   There are several sampling methods that can be used to identify the dominant plant species in the observation area. In the overstory, the species with the greatest relative **basal area** (cross-sectional area of a tree trunk in square inches, square centimeters, etc.) or canopy coverage would be considered dominant. Basal area can be measured with a basal area tape, prism, or diameter tape (with values converted to basal area). The dominant plant species in the shrub or understory layers can be determined by areal coverage or number of stems. Percent areal coverage may be measured by visually estimating the percent cover of each species with foliage extending into the sample area.

2. Record the plant indicator status (e.g. OBL, FACW, FAC, etc.) of the dominant plant species previously noted for each vegetation layer as listed in Appendix D.

Figure 5.4 - Vegetation Layers or Stratum

Adapted from 1987 USACE Wetlands Delineation Manual

3. Determine whether there is a predominance of wetland vegetation in the observation area. The objective is to determine whether the frequency of occurrence of the plants rated as hydrophytes (OBL, FACW+, FACW, FACW-, FAC+, FAC) is greater than the frequency of occurrence of the plants that are not rated as hydrophytes (FAC-, FACU+, FACU, FACU-, UPL). When more than 50 percent of the dominant plant species in an area have an indicator status of OBL, FACW+, FACW, FACW-, FAC+, and/or FAC, a predominance of wetland vegetation is present and the wetland vegetation parameter is satisfied.

   If the vegetation in the observation area is not dominanted by hydrophytic plant species, then it is unlikely that it is a wetland. The user should proceed toward the obvious wetland area and repeat this step until a predominance of wetland vegetation is found. However, circumstances may exist where the presence of aquatic life can be used to satisfy this parameter in the absence of a predominance of wetland vegetation. See Chapter 3 for information related to the identification of aquatic life.

4B. Determine whether visual evidence of wetland hydrology is present.

Examine the area occupied by the hydrophytic vegetation or aquatic life for the positive indicators of wetland hydrology described in Chapter 2. The primary indicators of wetland hydrology are:

- Visual observation of inundation
- Visual observation of soil saturation
- Watermarks
- Drift lines
- Sediment deposits
- Drainage patterns within wetlands

Secondary indicators to support evidence of wetland hydrology are:

- oxidized root channels (rhizospheres) associated with living roots in the upper 12 inches of the soil
- water-stained leaves
- local soil survey hydrology data for identified soils
- FAC-neutral test
- Bare soil areas
- Morphological plant adaptations

One primary indicator or two secondary indicators must be present to conclude that wetland hydrology exists. Any portion of the area with evidence of hydrology, and a predominance of wetland vegetation or aquatic life, is considered to be wetland.

4C. Determine if hydric soils are present.

If visual evidence of wetland hydrology is not present, the user can rely on hydric soil characteristics as an indicator of inundation and saturation. Hydric soils can also provide more documentation of the presence of wetland conditions in cases where there is visual evidence of wetland hydrology. To determine whether a hydric soil is present, complete the following steps:

1. Remove all loose-leaf matter, needles, bark, and other easily identified plant parts (duff layer) to expose the surface.

2. Dig a hole approximately 16 to 20 inches deep with a spade. Digging a 32-inch deep hole may be required in some instances, such as in cases when a significant amount of organic material in the upper horizons is present. In some cases, use of a soil probe or auger may be an appropriate alternative to a spade.

3. Determine whether any hydric soil indicators are present. As described in Chapter 4, the hydric soil indicators for non-sandy soils are:

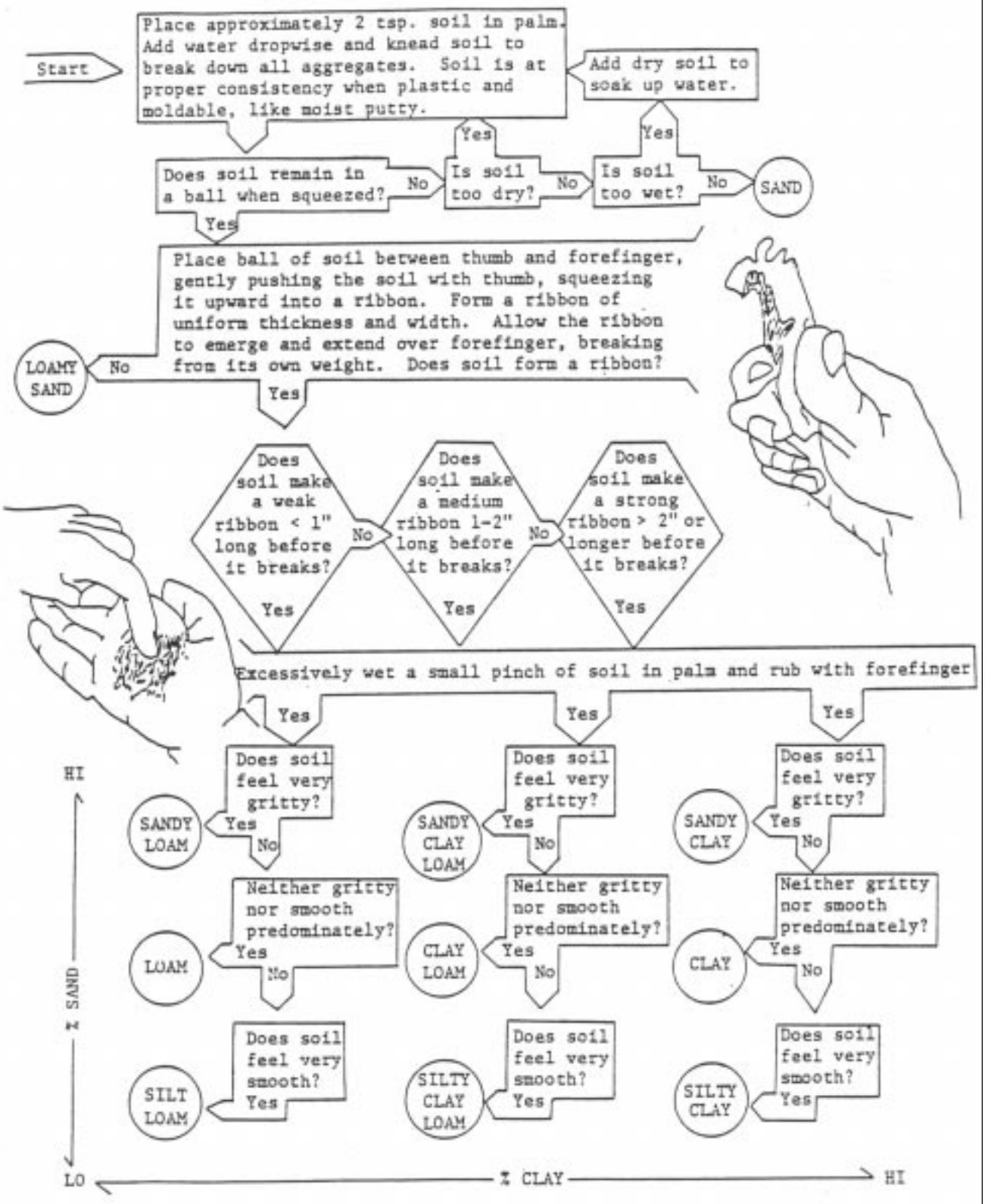
    a. Organic soils (Histosols)
    b. Histic epipedons
    c. Sulfidic material
    d. Aquic or peraquic moisture regime
    e. Reducing soil conditions (ferrous iron test)
    f. Soil colors (gleyed soils or soils bright mottles and/or low matrix chroma)
    g. Soil appearing on hydric soils list
    h. Iron and manganese concretions

    Soil color is determined by placing a small portion of moist soil in the openings behind the color pages of the Munsell Soil Book color charts and matching the soil color to the appropriate color chip. Soil chroma should not be rounded up to qualify as meeting a hydric soil indicator. For example, a soil matrix with a chroma between 2 and 3 should be listed as having a chroma of 2+ and would not meet any indicator requiring a chroma of 2 or less (USDA, 1998).

    Not all indicators listed above can be applied to sandy soils. In particular, soil color should not be used as an indicator in most sandy soils. However, three additional soil characteristics may be used as a indicators of sandy hydric soils:

    i. High organic matter in the surface horizon
    j. Streaking of subsurface horizons by organic matter
    k. Organic pans

Figure 5.5 - Soil Texture by Feel



Adapted from: Thien, Steve J. 1979. A flow diagram for teaching texture-by-feel analysis. Journal of Agronomic Education, 8:54-55.

If the observation area has a predominance of wetland vegetation or aquatic life and has at least one indicator of hydric soils, it would be considered wetland according to Part 303.

4. The supplemental hydric soil indicators described in the 1998 NRCS guidebook and provided in Appendix F may be used to confirm the above listed hydric soil indicators. These indicators may require the determination of soil texture at certain depths (refer to Figure 5.5).

4D. If the starting point does not have indicators of wetland hydrology, repeat Steps 4A through 4C at other points along the transition zone.

Step 4: Point Determination Method

4A. Determine whether a predominance of wetland vegetation is present.
4B. Determine whether visual evidence of wetland hydrology is present.
4C. Determine whether hydric soils are present.
4D. If the starting point does not have indicators of wetland hydrology, repeat Steps 4A through 4C at other points along the transition zone.

If there are no indicators of wetland hydrology (i.e., no visible hydrological indicators or no hydric soils) within the area dominated by wetland vegetation or aquatic life, then proceed toward what appears to be the obvious wetland area to another point dominated by wetland vegetation or aquatic life. Evaluate this area as previously outlined in Steps 4A through 4C. Repeat this process until both wetland hydrology (which may be hydric soils) and wetland vegetation or aquatic life are present.

Step 5. Identifying the Wetland Boundary

Using the Point Determination Method as described in Step 4, the user is able to determine the wetland boundary at one single point. In Step 5, the user proceeds to establish a series of wetland boundary points around the wetland area. The user can then connect these points on the base map to establish the wetland/non-wetland boundary.

The initial point determined to be wetland in Step 4 should be flagged or staked and labeled/numbered for future reference. The location of this initial point should be noted on the base map. From this initial point the user should proceed to flag the estimated wetland boundary at intervals close enough to be easily followed by a property owner or surveyor. It will be necessary to repeat the Point Determination Method at any point of uncertainty or where conditions change enough to warrant verification of the vegetation and/or hydrology status. Indicate each point on the base map where the Point Determination Method is performed and the wetland boundary point is established. This procedure should be repeated until the wetland boundary connects to the starting point or comes to a property line. The approximate wetland boundary should then be established on the base map.

Step 5: Identifying the Wetland Boundary

If the wetland continues off the property in question, the user should proceed along the property line to the approximated opposite side of the wetland. The Point Determination Method should be used to establish the wetland boundary at a point on the opposite side. The user should then establish the wetland boundary along this opposite side back to the starting point.

Duplicate the above procedures for all areas of wetland on the site or within the area. Care must be taken to ensure that all wetland areas are identified during the evaluation.

Step 6. Documentation of Wetland Conditions

The field method described in this chapter can be documented in a variety of manners, including recording plant lists, hydrologic and soil indicators, and mapping boundaries found on site. An example of a form that can be used for recording this information is provided in Appendix G. The amount of specific documentation needed will vary depending on the individual site conditions and existing circumstances.

If necessary, the wetland boundaries determined on site can be depicted to scale on a two-dimensional map. The most accurate way of depicting the boundary on a two-dimensional map is to mark locations on-site, have the property owner arrange to have a survey of the marked locations done by a registered land surveyor, and then connect those points on the plan to show the wetland boundary. Other methods, such as tracing boundaries on aerial photographs or estimating distances and plotting field points on a map relative to the plotted location of known features, are much less accurate.

Extensive documentation of the reasons for concluding the presence of wetlands on a site is sometimes desirable or necessary. In some cases, wetlands are disturbed and specific on-site information is necessary to establish pre-disturbance conditions. Detailed information on the vegetation, aquatic life, hydrology, and soils (if necessary) should be recorded at enough data points to document the existence of wetlands. This may require recording data at every point, every second or third point, or at another interval as deemed adequate. It may also be desirable to run **transects** through transition zones to document the changes from upland to wetland conditions.

Step 6: Documentation of Wetland Conditions

The user may opt to use a more formalized approach to document the wetland conditions. The 1987 USACE Manual outlines procedures involving the establishment of transects and sample plots. This Comprehensive Determination Method, or some variation of it, will be considerably more time consuming, but will result in extensive documentation of the on-site conditions.