

Field Exercises for Hydric Soils Determinations

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Introduction

The following document provides a listing of field exercises that can be utilized to set up locally-led field exercises for practicing identifying hydric soils. Field exercises starting with a soil texture and soil color exercise that can be done anywhere, followed by suggested field exercises, prioritized based on the length of time available to do the exercise. Each exercise has recommendations on how trainers can shorten or lengthen the exercise based on time.

Background

These hydric soils on-the-ground training recommendations have been created as part of an EPA Wetland Program Development Grant-funded project to develop and deliver high quality wetland training to on-the-ground wetland professionals. Other components of this project have been the development of a series of live webinars, development of online training modules designed to provide participants with anytime/anywhere access to online training resources, a compilation of information about wetland training needs and the characteristics of high quality wetland training, as well as a new web-based site to share information about existing wetland training opportunities nationwide. Information about ASWM's hydric soils training offerings can be found on the ASWM website at:

<http://www.aswm.org/wetland-science/soils>

Exercises for On-the-Ground Hydric Soils Training

A. Field Exercises that Can be Held Anywhere

1. Soil Texture Exercise

Collect a variety of soil textures and if possible send a subsample to a lab for textural analysis. It is best if samples contain organic soil material (if possible muck, mucky peat and peat samples), mucky modified loamy or clayey material, mucky modified sandy material, a variety of sandy textures (sandy, loamy sand, coarse sand, loamy fine sand, etc.) and a variety of loamy textures (sandy loam, loam, silt loam, clay loam, etc.). Samples can be used for multiple demonstrations as long as care is taken to not mix samples.

Supplies

- Known textural samples in plastic bags or bins
- Spray water bottles
- Towels or paper towels for cleaning hands
- Textural triangle with marks indicate split between sandy soils and loamy or clayey soils
- Textural flow chart for analyzing a soil texture by feel

How to Conduct the Exercise

Have instructor demonstrate how to distinguish between organic soil material, mucky modified mineral, sandy textures, and loamy or clayey textures using known samples.

Have participants take a small handful of a sample in the palm of their hand. Moisten with the water bottle. Using textural triangle and flow chart determine each soil texture. Have participants place sample back in container and wash hands thoroughly so as to not contaminate the next sample.

Have a label or card with info on the each known textural sample with texture, and percent sand and clay if known so that the participants can check their results with the actual soil texture.

2. Soil Color Exercise

Collect soil samples with a variety of soil matrix colors (mineral and organic colors) and redoximorphic feature and organic feature patterns. Make sure to include a sandy soil with masked and unmasked sand grains. Unlike the texture samples, these samples will likely have to be collected each time the exercise is done. You need intact clods that the participants can observe and break down to assess soil color.

Supplies

- Soil samples for assessing soil color in plastic bags or bins
- Spray water bottles
- Munsell Soil Color Charts
- Towels or paper towel for cleaning hands

How to Conduct the Exercise

Have instructor demonstrate the use of the Munsell Soil Color Chart describing matrix color and any redoximorphic feature color or organic feature color. If soils are dry demonstrate how to moisten the soil.

Have participants take a sample and do a soil color analysis describing both matrix and redoximorphic feature or organic feature colors as well as any other mottle colors that may occur in the sample. Make sure they moisten the soil if the sample is dry.

If clods are big enough to salvage have them place them back in the container. If the soil has been picked apart to the point it is no longer usable to assess soil color then discard the sample.

B. Field Exercises that Require Location of a Site Meeting the Needs of the Exercise

It is helpful to put together a one page field card of the Field Indicators approved for use where the field exercise is located. Have copies of blank soil portions of the wetland data forms from the Regional Supplement for the area available to be filled out at each site.

3. Redoximorphic Features in a Soil Catena Exercise

Find a site that is loamy or clayey textures and has a soil catena from well drained to poorly or very poorly drained that has a good expression of Redoximorphic features. The hydric soil at the boundary

should either meet F3 Depleted Matrix, A11 Depleted Below Dark Surface, and/or F6 Redox Dark Surface. Soils on the interior of the wetland could be wetter and exhibit other indicators. If possible have soil pits dug either by hand or backhoe in advance of the exercise to make it easier to see the patterns of Redoximorphic features in the soil. If done in the wet season a pump may be needed in the wetter sites to remove water from the pit.

Supplies

- Shovels or backhoe to dig pits
- Pump if needed
- Field Indicators of Hydric Soils in the United States
- Knife, screw driver, or other implement for excavating samples from the side of pit
- Measuring tape
- Munsell Soil Color Chart
- Golf tees or nails for marking division between layers and/or horizons
- Soils Portion of Wetland Data Form from Regional Supplement
- Pen or pencil
- Soils section of Regional Supplement
- Textural triangle, texture flow chart, and any other reference material to assist with writing soil description

How to Conduct the Exercise

Split the participants into groups based on the number of pits available.

Depending on time you can either have one group describe each pit or rotate the groups and have each group describe all the pits. Have them use golf tees or nails to mark where they chose to split layers or horizons.

Have instructors at each pit or rotate amongst the pits to assist the participants in their soil descriptions.

Soils portion of the data form should be filled out completely.

Depending on the size of the group you can either review the pits with each individual group or bring the whole group together and go to each pit and discuss the results of their soil description and determination.

Make sure to focus on proper redoximorphic feature descriptions and discuss the effects of water table depth on the soil morphology in each pit as you get wetter. You can also discuss how soil morphology can help you to assess water source and hydroperiod.

4. Field Indicators Exercise

Find a site that contains multiple Field Indicators. Floodplains are often good for finding a variety of textures as well as organic and redoximorphic feature based indicators.

Supplies

- Spade or sharp shooter to dig hole

- Auger in case participants want to or need to dig deeper than they can dig with spade or sharp shooter
- Field Indicators of Hydric Soils in the United States
- Knife, screw driver, or other implement for excavating samples from the side of pit
- Measuring tape
- Munsell Soil Color Chart
- Golf tees or nails for marking division between layers and/or horizons
- Soils Portion of Wetland Data Form from Regional Supplement
- Pen or pencil
- Soils section of Regional Supplement
- Textural triangle, texture flow chart, and any other reference material to assist with writing soil description

How to Conduct the Exercise

Before starting the exercise have one of the instructors demonstrate how to dig a hole with a spade or sharp shooter and auger if needed and lay out that profile. Use golf tees or nails to mark where layer or horizon boundaries occur.

Separate participants into small groups. Spread the groups out on a transect or at targeted locations where the groups will encounter a variety of field indicators. If time allows have them describe a soil on the wet side of the hydric soil boundary and the dry side of the hydric soil boundary. If time is limited they could just do the hydric soil description. If soil get wetter and there are different field indicators as you get wetter, if time allows you can also have them describe the wetter soil profile as well. Have them layout soil profiles and mark layer or horizon boundaries with golf tees or nails.

When groups are finished with their descriptions and have decided on what Field Indicators they meet bring the group together and either go to each hole and have the group review their description or visit sites that meet different field indicators and discuss.

5. Organic Soil Exercise

Find a site that has organic soils to demonstrate how to identify organic soil materials. It is helpful if the site has a variety of organic soil material types (muck, mucky peat, or peat), and even more helpful if it also contains mucky modified textures or mineral material as well so you can demonstrate how to distinguish between mineral, mucky mineral and the different types of organic with samples of each.

Supplies

- Spade or sharp shooter
- May need peat auger, King sampler, or auger depending on characteristics of the soil below
- Field Indicators of Hydric Soils in the United States
- Knife, screw driver, or other implement for excavating samples from the side of pit
- Measuring tape
- Munsell Soil Color Chart
- Golf tees or nails for marking division between layers and/or horizons
- Soils Portion of Wetland Data Form from Regional Supplement

- Pen or pencil
- Soils section of Regional Supplement
- Textural triangle, texture flow chart, and any other reference material to assist with writing soil description

How to Conduct the Exercise

Have an instructor demonstrate how to distinguish between the textures onsite. Hopefully this will include distinguish between types of organic soil material (muck, mucky peat and/or peat (peat is hard to find)) and mucky modified mineral and/or mineral.

Split groups and spread them out and have them write a soil description. Layout soil profile and mark boundaries between layers and horizon with golf tees or nails. Fill out soils portion of data form.

In many cases on sites with organics the soil will be very similar so at these sites you may want to pick and choose which group's sites you want to visit as a whole group based on which sites demonstrate different things as opposed to going to each site.

6. Sandy Soils and Problem Soil Exercise(s)

Supplies

To be added

How to Conduct the Exercise

If time allows you should try to locate a variety of sites that demonstrate sandy soil indicators or problem soil indicators. These sites can be used for a show and tell type exercise where the instructor digs a hole and the participants observe the soil as a whole group or the exercise can be conducted similar to the second exercise where groups are placed on a transect and told to describe a soil on the wet side of the line and if time allows the dry side of the line. For problem soils, if there is no indicator for the specific problem then it is best to just do a show and tell and describe the issue that is causing the problem since the participants will not be able to utilize an indicator.

7. Hydric Soil Technical Standard Exercise

This exercise is to demonstrate the use of the technical standard. This is an exercise that is probably only needed if the participants are interested in monitoring. However, components of the technical standard such as the use of piezometers, IRIS tubes and alpha-alpha dipyrindyl die can be helpful for assessing problem soils and mitigation success.

Supplies

- Spade or sharp shooter
- Auger with a diameter that will accommodate the width of the piezometers and wells
- Soil probe, Oakfield, punch tube that will accommodate the width of the IRIS tube
- Field Indicators of Hydric Soils in the United States
- Knife, screw driver, or other implement for excavating samples from the side of pit
- Measuring tape

- Munsell Soil Color Chart
- Golf tees or nails for marking division between layers and/or horizons
- Soils Portion of Wetland Data Form from Regional Supplement
- Pen or pencil
- Soils section of Regional Supplement
- Textural triangle, texture flow chart, and any other reference material to assist with writing soil description
- Well
- Piezometer
- Gravel
- Bentonite
- Buckets for gravel, bentonite, slurry for redox electrodes
- Water
- Implement for mixing slurry (drill, dowel rod, paint stirrer)
- Soil temperature electrode
- 5 Platinum electrodes
- Reference electrode
- Voltmeter and wire
- Solution to test electrodes
- 5 IRIS tubes
- Alpha-alpha dipyrindyl dye or strips
- Data form for recording data

How to Conduct the Exercise

This can either be a show and tell demonstration or if you have enough equipment to split the participants into smaller groups so that each group has their own equipment groups can install equipment themselves.

First the soil should be described and the soils portion of the wetland data sheet should be filled out in a similar manner to other exercises. Then the equipment should be installed following the requirements in the hydric soil technical standard. Focus should be on proper installation of the equipment and making sure that equipment that is being utilized to assess a site is close together and all on the same contour so that it is all measuring the same conditions.

A sample dataset can be given to the participants so that they can evaluate the data to determine if it meets the hydric soil technical standard. This dataset should include piezometer data, Eh data, IRIS tube data, alpha-alpha dipyrindyl dye data, and both onsite rainfall data as well as the normal rainfall data range for the site.

For More Information

For more information about ASWM's Hydric Soils Training Project and resources, please contact Brenda Zollitsch, ASWM Policy Analyst, at brenda@aswm.org or call (207) 892-3399.