TRIP REPORT

DATE OF TRIP: Sept. 19-28, 1994

DATE OF REPORT: October 9, 1994

TO: Maurice Mausbach
Asst. Director, Soils Division
USDA, SCS
P.O. Box 2890
Washington, DC 20013

TO: Donald Woodard
NWI Group Leader
DOI, FWS, NWI
9720 Executive Center Drive
St. Petersburg, FL 33702

FROM: G. Wade Hurt, Soil Scientist, SCS/FWS

BACKGROUND: It is perceived by many that hydric soil indicators are not present in many soils that support wetland vegetation and have wetland hydrology on frequently flooded floodplains.

PURPOSE OF TRIP: The purpose of this trip was to prove or disprove the background statement and to identify additional, if any, Hydric Soil Indicators needed for soils that are associated with wetlands on flood plains.

DATES, PARTICIPANTS, LOCATIONS, and FINDINGS:

Date: Monday, September 19:

Participants: Susan Knowles, USFWS; Bobby Ward, Tom Ziegler, Bill Hosteter, Byron Nagel, and Steve Ross, Indiana SCS. Wade Hurt SCS/USFWS

Location: Flood plains and adjacent non-flooded wetlands of the Muscatatuck River Area, Indiana

Findings #1 (Muscatatuck National Wildlife Refuge): The area is mapped as Typic Fluvaquents but is actually a complex of Typic (40%) and Aeric (60%) Fluvaquents. The Typic areas have classic redoxomorphic hydric soil indicators. The Aeric areas are approximately 30 % hydric and 70 % non hydric. The hydric areas had the following indicator; "Presence of a layer within 12 inches of the surface, not overlain by material with chroma of 3 or more, that has chroma 2 or less with 20 percent or more by volume of redoxomorphic depletions that have value of 5 or more and chroma of 1 or less." The hydric Aeric areas are the classic "upside down" Aerics subgroups of Aquic suborders with chroma 2 dominated materials above chroma 3 dominated materials. This is quiet common in areas flooded by oxygenated water that becomes reduced in the upper part due to the presence of organic carbon as the energy source and remains oxygenated in the lower part due to the absence of organic carbon. 15 DAY FLOOD MAPS ARE NOT AVAILABLE FOR THIS AREA.

Findings #2 (Hydric Soils on Adjacent non-flood plains): This area is a Typic Glossaqualf with classic redoxomorphic hydric soil indicators.

Date: Tuesday, September 20:

Participants: Tom Ziegler and Bill Hosteter, Indiana SCS. Wade Hurt SCS/USFWS

Location #1: Non-flooded Wet Soil Monitoring Site, Wallace, Indiana.

Findings #1: Typic and Aeric Endoaqualfs on non flooded sites were observed, in addition to the classic redoxomorphic hydric soil indicators, mn/fe concretions were observed in hydric soils. Vegetative and hydrology data are available. To correlate hydric soils to vegetative and hydrologic data the following hydric soil indicator is needed: "Presence of redox concentrations as iron or manganese concretions, 2 - 5 mm. in size occupying more than 2 percent of the soil volume. The concretions are in a matrix with chroma of 2 or less within 12 inches of the surface. Iron and manganese concretions most commonly are on the soil surface and within the upper 6 inches of the soil. They are 2 to 5 mm in size and have a value of 3 or less and a chroma of 3 or less; most commonly they are black".

Location #2: Flood plain of Hunley creek tributary of Patoka River, Indiana.

Findings #2; Aeric and Typic Fluvaquents on flood plains were observed. To correctly identify hydric soils on these flood plains and non-flooded wetlands (discussed above) the following should be added to the above indicator. "Either the soil matrix is chroma 2 or less or common to many mottles of chroma 2 or less exist in flooded soils. The soil matrix is chroma 2 or less in non flooded soils". 15 DAY FLOOD MAPS ARE NOT AVAILABLE FOR THIS AREA.

Comment: Use of hydrogen peroxide and intense heat to detect the presence of reduced manganese and reduce the masking effects of organic carbon was tested throughout this trip. Results proved inconclusive except as noted on the attached listing of hydric soil indicators.

Date: Wednesday, September 21

Participants: Tom Groutage, USFWS; Tonie Endres, Ken Gotsch, and Bob McLeese: Illinois SCS. Wade Hurt SCS/USFWS.

Location: Wabash River Flood Plain, Illinois

Findings: Observed non hydric Aeric Fluvaquents, hydric Typic Fluvaquents, and hydric Fluventic Endoaquolls near the 15 day flood line. The 15 day flood data projections are available (maps are not available). The non hydric Aeric Fluvaquents appear to be above the 15 day flood line and the hydric Fluvaquents, and hydric Endoaquolls appear to be below the 15 day flood line. No additional hydric soil indicators were observed.

Date: Thursday, September 22: Jerry Berning, and Bob McLeese, Illinois SCS. Wade Hurt SCS/USFWS.

Location #1: WRP Area Illinois River, Illinois

Findings #1: This area had 15 day flood maps on 2 foot contours. Observed non hydric Aeric Fluvaquents, hydric Typic Fluvaquents, and hydric Fluventic Endoaquolls within the 15 day flood line. The non hydric Aeric Fluvaquents were on approximately the same elevations as areas above the 15 day flood line. The hydric Typic Fluvaquents, and hydric Fluventic Endoaquolls were below the 15 day flood line. Clearly the 15 day flood maps provide excellent off-site data but, due to elevation accuracy limitations, they should not be used for on-site wetland/hydric soil determinations. Field hydric soil indicators should be used on-site.

Location #2: Bee Creek Area, Illinois River, Illinois

Findings #2: Observed hydric soils that were in wetlands and cropped fields with the addition of the following indicator: "Presence of stratified layers in the upper 6 inches. At least one layer contains material that has value of 3 or less with chroma of 1 or less and all other strata have chroma of 2 or less".

Date: Friday, September 23:

Participants: Doug Oelmann, Iowa SCS; Jerry Berning, and Bob McLeese: Illinois SCS. Wade Hurt SCS/USFWS.

Location: Mark Twain National Wildlife Reserve, Illinois River, Illinois

Findings: Confirmed existence of the "stratified layers" hydric soil indicator in wetlands and hydric cropped fields. Confirmed the existence of the "mn/fe concretions" hydric soil indicator in wetlands and hydric cropped fields. These indicators are present in sandy and non-sandy hydric soils.

Date: Monday, September 26

Participants: Al Younk, Bob Diderkson, Mark La Van, and Gregg Schellentrager, Iowa SCS. Wade Hurt SCS/USFWS.

Location #1: Chariton River Flood Plain, Iowa

Findings #1: Confirmed the need for the "Stratified Layers" hydric soil indicator. The collaboratory indicator of distinct/prominent redox mottles on the bedding planes also existed. 15 DAY FLOOD MAPS ARE NOT AVAILABLE FOR THIS AREA.

Location #2: Non-flooded Side Slope, North of North Fork English River, Iowa

Findings #2: A Typic Argiaquoll on a 7 percent southwest facing slope was observed. The following hydric soil indicators were observed at a depth of about 6 inches on the Carex spp. dominated slope: distinct/prominent high chroma mottles and common mn/fe concretion is a chroma 2 matrix.

Location #3: Flood Plain of Iowa River, Iowa

Findings #3: Again confirmed the existence of the "stratified layers" hydric soils indicator in wetlands. 15 DAY FLOOD MAP ARE AVAILABLE FOR THIS AREA, but provide no assistance in delineating either wetlands or hydric soils.

Date: Tuesday, September 27

Participants: Al Younk, Mark Minger, Mark La Van, and Gregg Schellentrager, Iowa SCS. Wade Hurt SCS/USFWS.

Location #1: Flood Plain of Cedar River, Iowa

Findings #2: No additional hydric soil indicators needed to delineate the soils on this flood plain. 15 DAY FLOOD MAPS ARE NOT AVAILABLE FOR THIS AREA.

Location #3: Flood Plain of Iowa River, Iowa

Findings #3: Again confirmed the existence of the "mn/fe concretions" hydric soil indicator in wetlands. 15 DAY FLOOD MAPS ARE AVAILABLE FOR THIS AREA, but provide no assistance in delineating either wetlands or hydric soils.

PERCEPTIONS:

Although representatives from SCS's sister federal agencies (USFWS, COE, and EPA) as well as various state and local agencies were invited to participate in the study of the hydric soils on flood plains of the Midwest, only USFWS participated. The other agencies missed the opportunity to concur with or disagree with the hydric soil indicators for Land Resource Region M. Sites were selected with care and represent what occurs throughout the states visited.

Soil Scientists are extremely honest, dedicated, and gullible people who have accepted the "monkey on the back" imposed by hydrologists and botanists. This needs to stop. Soil Scientists are responsible for soils, not some vague 300 foot wide and 10 foot delta elevation maps; not some estimated wetland vegetative status. Wetland hydrology exists where wetland hydrology exists; wetland vegetation exists where wetland vegetation exists; hydric soils exists where hydric soils. *pl. 3 f.*

RECOMMENDATION:

Background: Availability of 15 day flood maps on flood plains in the Midwest ranges from none to available as elevation projection by mileage to available on topographic quadrangles with 20 foot, 10 foot, or 2 foot contours. Although the maps, where available, provide assistance for off-site determinations just as soil survey maps and aerial photography provide assistance for off-site determinations, due to scale and elevation limitations they provide little assistance for on-site delineations. Maps with lines that are as wide as 300 feet and are have an average delta elevation of 10 feet provide virtually no assistance for on-site determinations. This is not an alien thought the same has been said for vegetative maps, NWI maps, and soil survey maps. All of these tools assist a delineator get the spot on the land where a delineation is needed. They don't make the delineation.

Recommendation: Use of 15 day flood maps should be as follows:

1. For off-site Food Security Act (FSA), Swampbuster, and Clean Water Act, Section 404 (CWA) wetland identification and for determining eligibility of Emergency Wetland Program (EWP) and Wetland Reserve Program (WRP) the 15 day flood maps should be used if available.

2. If 15 day flood maps are not available or only 15 day flood elevation projections exist, development of the maps or waiting for the development of the maps is not necessary. Alternative off-site procedures should be used.

3. For on-site hydric soil determinations in response to appeals or for any other reason the hydric soil indicators listed for Land Resource Region M should be used.

ACTION ITEMS: The Hydric Soil Committee should, as soon as possible, complete and finalize, as near as possible, the list of hydric soil indicators for LRR M.

ENCLOSURES: Hydric Soil Indicators for LRR M that I have observed that accurately locate the soil boundary between wetlands (therefore potential wetlands) and non-wetlands (therefore potential wetlands).

cc W/Enclosures: Bobby Ward, Bob McLeese, Gregg Schellentrager, Mike Whited, Susan Knowles, Tom Groutage, Buck Reed, Chris Smith, Arlene Tugle, DeWayne Williams

Field Indicators of Hydric Soils in the Central Feed Grains and Livestock Land Resource Region (M) with a Mesic Soil Temperature Regime (M). Unless otherwise indicated all layers above any of the following hydric soil indicator have dominant chroma of 2 or less.

Category MMA. All Soils:

User Notes for All Soils: Following the term "All soils" is a list of those hydric soil indicators that are "test positive" hydric soil indicators for all soils regardless of texture.

MMA1. Presence of hydrogen sulfide odor within 30 cm of the surface.

Sulfidic Odor User Notes: The sulfidic odor (or rotten egg smell) indicates the soil is reduced and therefore saturated much of the year. In some flood plain hydric soils the presence or absence of sulfidic odor could be related to the elevation of the flood plain above the stream level; present at high stream levels and absent at stream levels.

MMA2. Hue is 5GY, 5G, 5B or 5BG within 30 cm of the surface.

Gley Colors User Notes: Gley colors are not synonymous with gray colors. Gley colors are those colors with the indicated hue that are found on the gley page (Kollmorgen Corporation, 1975). Gley colors are not normally found in LRR M, but are included as indicators because their presence are easily identified and they are clearly associated with very wet soils.

MMA3. Presence of a mucky mineral surface layer that is 5 cm or more thick.

Mucky Texture User Notes: "Mucky" is a USDA texture modifier for mineral soils (Soil Survey Staff, 1993). The organic carbon is at least 6 to 10 percent. The percentage requirement is dependent upon the clay content of the soil; the higher the clay content the higher the organic carbon requirement. An example is mucky sandy loam which has at least 6 percent organic carbon but not more than about 12 percent organic carbon. O.M. = 1.724 X O.C.

MMA4. Presence of common to many redox concentration as distinct or prominent pore linings, value of 4 or more and chroma of 4 or more within 15 cm of the surface.

Pore Linings User Notes: For pore linings to be considered indicative of hydric soils they should be surrounding live roots or around old root holes. The remains of dead roots are not pore linings. Pore linings have a hue of 10 YR or redder, value of 4 or higher, and a chroma of 4 or higher (Kollmorgen Corporation, 1975). 2 percent or more by volume are required.

MMA5. Presence of stratified layers in the upper 15 cm. At least one layer contains material that has value of 3 or less with chroma of 1 or less.

Stratified Layers User Notes: The presence of stratified layers below a depth of about 6 inches or have strata with chroma of 3 or more are not indicative of hydric soils. Many non hydric alluvial soils have stratified layers at greater depths or strata with chroma of 3 or more. These are upland soils and do not support wetland vegetation.

MMA6. Presence of a layer within 30 cm of the surface that has chroma of 2 or less with 20 percent or more by volume of redoxomorphic depletions that have value of 5 or more and chroma of 1 or less.

Redox Depletions user notes. Redox depletions should occur on ped surfaces and within ped interiors. Areas with a similar appearance that occur only on ped surfaces may be "silt flows"; these are not indicative of hydric soils. This indicator is common on flood plains with "upside down" Aeric subgroups of Aquic Suborders where the soil is reduced in the upper part due to the presence of an organic carbon source and oxygenated in the lower part due to the absence of an organic carbon energy source.

Category MMS. Sandy Soils.

Sandy Soils User Notes: "Sandy soils" refers to those soils with a sandy USDA soil texture as coarse as loamy fine sand or coarser (Soil Survey Staff, 1993) and other soils that have a permeability of 6.0 in/hr or more.

Use either "sandy soil" or "other soil" indicators based on the dominant conditions within the upper 12 inches of the soil except as follows: Where an "other soil" layer occurs within 6 inches, "other soil" indicators should be used.

MMS1. Presence of muck 1 cm or more thick on the soil surface where no root or leaf mat are present.

MMS2. Presence of muck 3 cm or more thick on the soil surface and under a root or leaf mat.

Muck User Notes: Muck is sapric soil material (Soil Survey Staff, 1992 and 1993) with at least 12 to 18 percent organic carbon. The percentage requirement is dependent upon the clay content of the soil; the higher the clay content the higher the organic carbon requirement. Organic Matter (O.M.) = 1.724 X Organic Carbon (O.C.).

To determine if muck is present first remove loose leaves, needles, bark, and other easily identified plant remains. This is sometimes called a leaf/root mat. Then examine for decomposed organic soil material. The presence of a leaf or root mat is not indicative of hydric soils or upland soils; but probably indicates that the vegetation present produces a large amount of biomass. Hydric soil indicators determinations are made below the leaf or root mat.

MMS3. Presence of a layer in which iron/manganese oxides have been removed from the matrix exposing the primary base color of the soil material. Translocated oxides form a diffuse splotchy pattern of two or more colors having value of 5 or more and chroma of 1 and/or 2, and chroma 3 and/or 4 within 15 cm of the surface. Splotches are 1.5 to 3 cm in size.

Polychromatic Matrix User Notes: In some parts of MM, the polychromatic matrix may lack chroma of 3 and 4. If so, the polychromatic matrix will still have the splotchy pattern and, in addition, organic matter accumulations of value 3 or less and chroma of 1 or less should be present. This indicator, with an absence of chroma 3 and 4, should be used with extreme caution. Common to many (Soil Survey Manual, 1992a) areas of stripped (uncoated) soil materials 1.5 to 3 cm in size is a requirement.

Category MMO. Other Mineral Soils

Other Soils User Notes: "Other soils" refers to those soils with a USDA soil texture as fine as loamy very fine sand or finer (Soil Survey Staff, 1993).

MMO1. Presence of muck 2 cm or more thick on the soil surface where no root or leaf mat are present.

MMO2. Presence of muck 5 cm or more thick on the soil surface and under a root or leaf mat.

Muck User Notes: Muck is sapric soil material (Soil Survey Staff, 1992 and 1993) with at least 12 to 18 percent organic carbon. The percentage requirement is dependent upon the clay content of the soil; the higher the clay content the higher the organic carbon requirement. Organic Matter (O.M.) = 1.724 X Organic Carbon (O.C.).

To determine if muck is present first remove loose leaves, needles, bark, and other easily identified plant remains. This is sometimes called a leaf/root mat. Then examine for decomposed organic soil material. The presence of a leaf or root mat is not indicative of hydric soils or upland soils; but probably indicates that the vegetation present produces a large amount of biomass. Hydric soil indicators determinations are made below the leaf or root mat.

MMO3. Presence of redox concentrations as iron or manganese concretions, 2 - 5 mm. in size occupy more than 2 percent of the soil volume, in a matrix with chroma of 2 or less within 30 cm of the surface.

Iron/Manganese Concretions User Notes: Iron and manganese concretions most commonly are on the soil surface and within the upper 6 inches of the soil. They are 2 to 5 mm in size and have a value of 3 or less and a chroma of 3 or less; most commonly they are black. On flood plains either the soil matrix is chroma 2 or less or common to many mottles of chroma 2 or less exist. On other landforms the soil matrix is chroma 2 or less and the boundary between the concretions and soil matrix is diffuse.

Sometimes organic matter masks the identification of manganese concretions; however, reduced manganese effervesces in a weak solution of hydrogen peroxide. Manganese is not the only material that effervesces in the peroxide and therefore effervescence is not a positive hydric soil indicator; however, once the possible occurrence of manganese has been confirmed then the material can be sieved or otherwise handled to confirm the presence or absence of the concretions.

MMO4. Presence of redox concentration as distinct or prominent mottles, hue of 10YR or redder and chroma of 4 or more, in a matrix with a dominant chroma of 2 or less within 30 cm of the surface.

Distinct/Prominent Mottles User Notes: Distinct or prominent mottles are defined (Soil Survey Staff, 1993). The low chroma must be due to wetness and not a relic or parent material feature.

MMO5. Presence of redox concentration as distinct or prominent mottles, hue of 10YR or redder and chroma of 5 or more, in a matrix with a dominant chroma of 2 or less within 30 cm of the surface.

Distinct/Prominent Mottles User Notes: Distinct or prominent mottles are defined (Soil Survey Staff, 1993). Unlike the iron/manganese concretions indicator this indicator requires a matrix chroma of 2 or less. The low chroma must be due to wetness and not a relic or parent material feature. Relic and parent material features are most commonly found within peds; features that express current hydrology are on ped surfaces.

MMO6. Presence of a layer with an accumulation of calcium carbonate, or calcium carbonate equivalent, within 30 cm of the surface and immediately underlain by a layer(s) at least 25 cm thick having one or more of the following:

a. hue of 5GY, 5G, 5BG, 5B, or

b. hue of 2.5Y or yellower and
   1. chroma of 1 or less, or
   2. chroma of 2 or less and 2 percent or more by volume of distinct or prominent redox concentrations as iron masses, or

c. hue of 10YR or redder, chroma of 1 or less and 2 percent or more by volume of distinct or prominent redox concentrations as iron masses, or

d. value of 5 or more and chroma of 1 or less after carbonate removal with dilute HCL.

MMO7. A mollic epipedon less than 30 cm thick and immediately underlain by a layer(s) at least 5 cm thick having one or more of the following:

a. hue of 5GY, 5G, 5BG, 5B, or

b. hue of 2.5Y or yellower and
   1. chroma of 1 or less, or
   2. chroma of 2 or less and 2 percent or more by volume of distinct or prominent redox concentrations as iron masses, or

c. hue of 10YR or redder, chroma of 1 or less and 2 percent or more by volume of distinct or prominent redox concentrations as iron masses.

MMO8. A mollic epipedon having neutral hue with value of 3 or less or hue of 10YR or yellower with value of 2 or less and chroma of 1 or less throughout the upper 30 cm, chroma of 1 or less in the remainder of the mollic epipedon, and immediately underlain by a layer(s) at least 5 cm thick having one or more of the following:

a. hue of 5GY, 5G, 5BG, 5B, or

b. hue of 2.5Y or yellower and
   1. chroma of 1 or less, or
   2. chroma of 2 or less and 2 percent or more by volume of distinct or prominent redox concentrations as iron masses, or

c. hue of 10YR or redder, chroma of 1 or less and 2 percent or more by volume of distinct or prominent redox concentrations as iron masses.