SOUTH DAKOTA WETLAND MAPPING CONVENTION

TECHNICAL GUIDANCE

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SOUTH DAKOTA
NATURAL RESOURCES CONSERVATION SERVICE

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SOUTH DAKOTA WETLAND MAPPING CONVENTION GUIDANCE DOCUMENT

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INTRODUCTION

The intent of this document is to provide detailed instructions to support the current wetland mapping conventions. This document incorporates by reference the most current versions of the National Food Security Act Manual (NFSAM) and Circulars, the 1987 United States Army Corps of Engineers (USACE) Wetland Delineation Manual (Technical Report Y-87-1 ('87 Manual)), and the USACE Regional Supplements. These instructions take into account the regional, state, and local wetland characteristics unique to South Dakota (SD). This document adheres to regulations and policies in effect as of the date of this document and are subject to change based on modifications to the NFSAM or the USACE '87 Manual and Regional Supplements.

Persons identifying potential wetlands and conducting wetland determinations must have the appropriate "Wetland Job Approval Authority(s)" delegated and documented in accordance with current NRCS policy (Section III of the FOTG). The NRCS decision-maker ("Agency Expert") is reminded that size of an area is not part of the wetland criteria therefore, areas large enough to display evidence of wetlands on inventory tools or that are noted in the field will be evaluated. Agency Experts shall assure that the decision rendered is reflective of conditions that would occur on the site during:

- Normal Circumstances (minimally disturbed post 1985 conditions), and
- Normal hydrologic conditions

The regulations and the NFSAM refer Agency Experts to the USACE '87 Manual and appropriate USACE Regional Supplements. In SD, the Midwest Regional Supplement and the Great Plains Regional Supplement methodologies will be used to the extent that they do not conflict with the NFSAM. Where differences in the USACE Regional Supplements and the '87 Manual occur, the Regional Supplements take precedence over the '87 Manual. The USACE Regional Supplements continue to utilize the proven indicator-based approach to assemble evidence needed to render a sound decision. The NRCS, in coordination with the USACE and the United States Fish and Wildlife Service (USFWS), agreed to apply the Regional Supplement hydrology and vegetation indicators as stated within this document across Regional boundaries within SD.

PROCEDURE

The following section outlines the steps used to determine if adequate information currently exists for a site(s) and when onsite inspection may be necessary for a site(s). Identified sites are called "potential wetlands" in this procedure until the user determines if an on-site inspection is necessary (e.g. identifies if adequate information is not currently available for the site or if the site meets any of the conditions in Step 4. *If adequate information is currently available then "potential wetlands" will either be wetland or nonwetland (see step 4).*

Step 1: Preplanning and Remote Sensing

Step 2: Selection of the Determination Method

Step 3: Determine if Normal Circumstances Exists

Step 4: Determining if Adequate Information Exists

Step 5: Determine the Predominance of Hydric Soils

Step 6: Determination of the Prevalence of Hydrophytic Vegetation

Step 7: Determination of Wetland Hydrology

Step 8: Making a Wetland Determination

Step 9: Wetland Delineation

Step 1: Preplanning and Remote Sensing
To complete this step, the reviewer may choose to begin with one or more resources noted below to maximize the information on the location of potential wetlands. The NRCS policy, manual, and regulations do not limit the resources used.

ACTION:

A. Review the soil survey and the SD FOTG county hydric soils list to identify areas that may be potential wetlands. Identify listed hydric soil map units, map units with hydric soils as part of their name, or soils with hydric inclusions, and map units with conventional wetland symbols as evidence of potential wetlands.

B. Review the NRCS wetland inventory maps and official determinations, if available, to identify previously mapped wetlands as evidence of a potential wetland.

C. Review the National Wetland Inventory (NWI) maps to identify previously mapped wetlands as evidence of potential wetlands.

D. Based on knowledge of local conditions, review the appropriate Farm Service Agency (FSA) slide or slides selected from all available slides (regardless of annual precipitation), to identify evidence of potential wetlands. (In other words, pick a year that is wet but not record-setting). Any of the following signatures present on one or more slides would be considered as evidence of potential wetlands:

   - Hydrophytic vegetation
   - Surface water
   - Saturated conditions
   - Flooded or drowned-out crops
   - Stressed crops due to wetness
   - Differences in vegetation due to different planting dates
   - Inclusion of wet areas as set-aside or idled
   - Circular or irregular areas of unharvested crops within a harvested field
   - Isolated areas that are not farmed with the rest of the field
   - Areas of greener vegetation (especially during dry years)

E. Review all other inventory tools (where available) for evidence of potential wetlands.

   - Aerial photography (black and white; color infrared)
   - Digital orthoquads (DOQQ) imagery
   - USGS topographic maps
   - FEMA flood hazard maps
   - Stream gauge data and climatic data

F. Review the USGS NED 1/9 Arc Second LIDAR data if available for your county. [Currently only available for Minnehaha and Lincoln Counties.] This data provides 0.5, 1, 5 foot contours that may assist Agency Experts in identifying manipulations and potential wetland geomorphic position.

➢ Proceed to the next step.

Step 2: Selection of the Determination Method

ACTION: Choose either Option A or Option B.

- Option A – Conduct onsite determination with offsite tool review.
    - Identify potential wetlands from Step 1 then review 1986 and prior year aerial photography and existing case file scope and effect documentation to determine if any manipulation occurred prior to December 23, 1985. Document findings and proceed to Step 5.

- Option B – Potentially conduct offsite determination. Proceed to Step 3.

Step 3: Determine if Normal Circumstances Exist

ACTION: Review the 1986 and prior year slides to determine if any manipulation (e.g. ditch) or cropping occurred prior to December 23, 1985. If so, then the pre-1985 manipulation and cropping are "Normal Circumstances." Please remember that Normal Circumstances exist without regard to the removal of herbaceous vegetation. Review existing case file scope and effect documentation.

- If normal circumstances exist, then proceed to the next step.

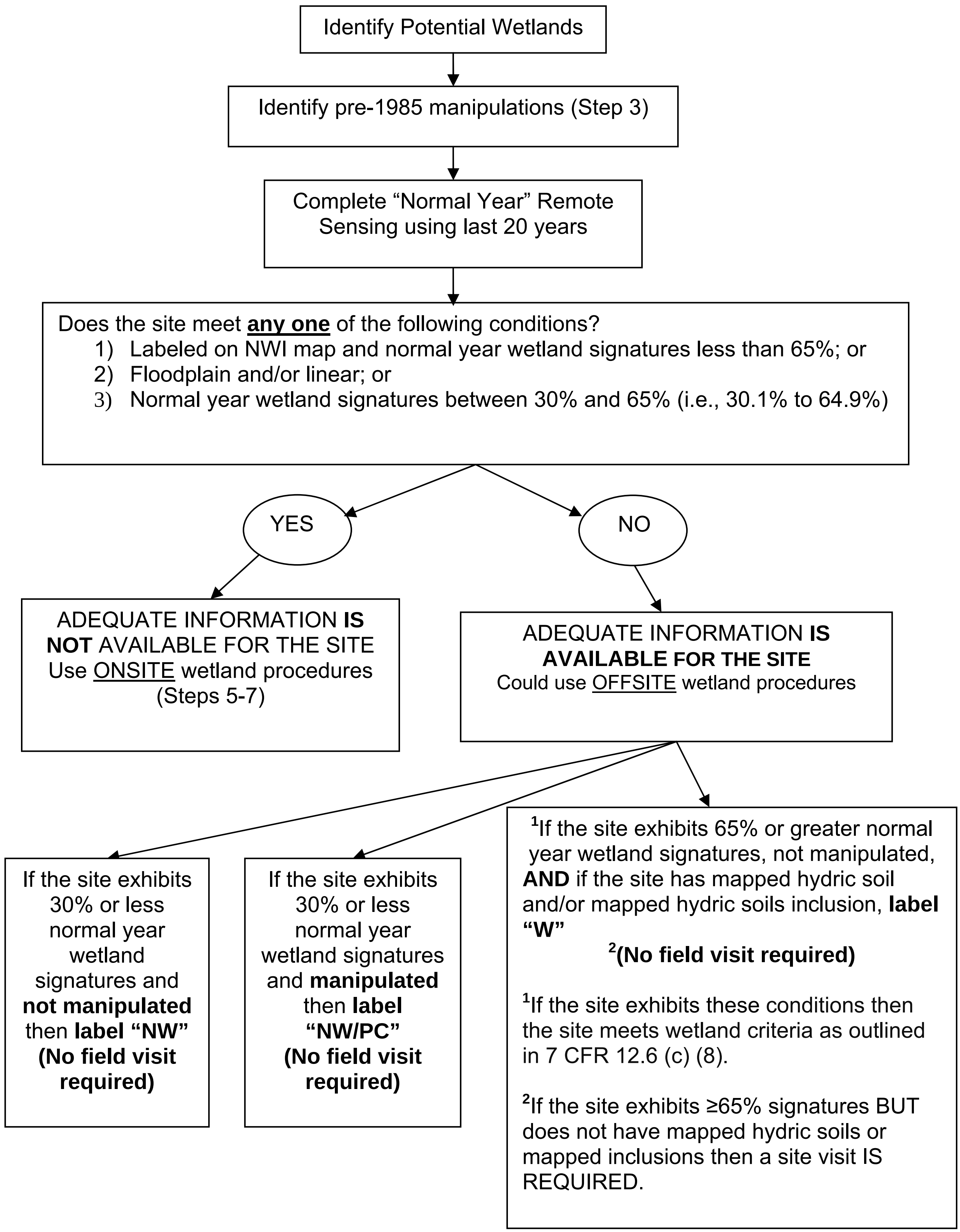
- If the site has been disturbed such that normal circumstances do not exist, then you must go on-site. A comparison reference site may be used. The use of a reference site can be made in the field either after or during the site visit. Proceed to the next step.

Step 4: Determining if Adequate Information Exists

ACTION: Determine if the site is a pothole or playa, follow the flow chart below and document the findings. A site field visit **is not** required if the site **meets the "offsite"** conditions; however, a site field visit is always an **option** to the wetland delineator. A field visit **is** required for any sites that are **appealed** or if a site **does not meet "offsite"** conditions.

- If all sites are determined to have adequate information and meet the offsite conditions then proceed to Step 8, otherwise proceed to Step 5 for potential wetlands not meeting offsite conditions.

SEE NEXT PAGE FOR FLOW CHART


Identify Potential Wetlands
Identify pre-1985 manipulations (Step 3)
Complete "Normal Year" Remote Sensing using last 20 years
Does the site meet **any one** of the following conditions?
1) Labeled on NWI map and normal year wetland signatures less than 65%; or
2) Floodplain and/or linear; or
3) Normal year wetland signatures between 30% and 65% (i.e., 30.1% to 64.9%)
YES
NO
ADEQUATE INFORMATION **IS NOT** AVAILABLE FOR THE SITE Use ONSITE wetland procedures (Steps 5-7)
ADEQUATE INFORMATION **IS AVAILABLE FOR THE SITE** Could use OFFSITE wetland procedures
If the site exhibits 30% or less normal year wetland signatures and **not manipulated** then **label "NW" (No field visit required)**
If the site exhibits 30% or less normal year wetland signatures and **manipulated** then **label "NW/PC" (No field visit required)**
[1]If the site exhibits 65% or greater normal year wetland signatures, not manipulated, **AND** if the site has mapped hydric soil and/or mapped hydric soils inclusion, **label "W"**
[2]**(No field visit required)**
[1]If the site exhibits these conditions then the site meets wetland criteria as outlined in 7 CFR 12.6 (c) (8).
[2]If the site exhibits ≥65% signatures BUT does not have mapped hydric soils or mapped inclusions then a site visit IS REQUIRED.

Step 5: Determine the Predominance of Hydric Soils
The Food Security Act (Act) does not require that 100 percent of the wetland experience saturation, inundation, or conditions resulting in hydric soils. Rather, the statute and the CFR both support a more practical and ecologically sound approach; whereas, wetlands must be dominated by hydric soils (*predominance*) and wetland plants (*prevalence*). It is understood that small odd areas of soils that did not develop under periods of reduced oxygen can occur within a wetland. Wetland determinations are conducted to assist participants in remaining compliant (not make production possible or more possible). Thus, the scale of the NRCS wetland determination need not address small non-wetland areas within a wetland.

Field verification of hydric soils consists of (1) making an on-site soils investigation to verify the soil series or (2) conducting a soils investigation to characterize the surface profile according to guidance in the most current version of the *"Field Indicators of Hydric Soils in the United States, A Guide for Identification and Delineating Hydric Soils"* located at http://soils.usda.gov/.
All approved field indicators of hydric soils included in the aforementioned document are based on long-term monitoring studies. Only one indicator of hydric soils is needed to determine that the site supports a predominance of hydric soils.

The onsite soils analysis is typically made at a landscape position that is representative of the community being characterized (e.g. not near the boundary of two plant communities or not at a micro-high or micro–low within the community). Typically in SD sites might be so wet that features fail to develop or are masked in the wettest landscapes. When this situation occurs, additional soil investigations shall be made along the edge of the potential wetland, where redoximorphic features might be more prevalent.

A decision is made by the Agency Expert regarding the number of holes based on site conditions and confidence in soils mapping. Because holes are typically located in representative landscape positions, soil features encountered within a single location should be similar. If a wide range of characteristics are observed, then the Agency Expert should consider digging more holes.

ACTION: Sample the area for hydric soils. Refer to the flow charts on form SD-LTP-30 for additional information. Refer to Attachment A for Munsell Soil Help Charts.

- If hydric soils are field identified in a representative location then identify the hydric soil indicator(s), and brief soil description if necessary, then document findings (per the instructions) on form SD-LTP-29. Proceed to Step 6.

- If the on-site soils analysis demonstrates that a predominance of soils fails to meet the Act hydric soil definition (or no hydric soil indicator(s) are observed), then the area is not a wetland. No further investigation is required. Document the findings on form SD-LTP-29. Proceed to Step 8.

Procedure for Hydric Soil Determination
Field experience, in SD, has shown the reliability of indicator A12 (old TF7) is very dependent on landscape and landform. Experience has shown that many sites in linear, flood plain, slope, and open drainage landforms have a plant community that is not hydrophytic, hydrology is not present, the soils do not meet indicator F6, yet still meet indicator A12. In depressional landscapes, indicator A12 has been found to be reliable.

Therefore, indicator A12 is approved only in depressional landforms in SD. If a soil in a depressional landform does not meet field indicator A11 or F6, and does not meet any other indicator, the site will need to be investigated to see if it meets indicator A12.

1. Investigate starting from the edge of the suspected hydric area and look for a representative spot.

2. Use a spade or shovel to investigate the top 18 inches. The use of a spade will help make soil determinations easier because it allows you to see more surface area than can be seen using a push probe or auger. If needed, a push probe or hand auger maybe used.

NOTE: SD codified law (Chapter 49-7A) describes the One Call notification system for excavation activities. SD law requires notification to the SD One Call System if you plan to conduct a site investigation which involves digging or auguring (with hand or mechanic equipment) below 18 inches on agriculture land.

NOTE: Go no deeper than 48 inches from the soil surface. If the soil is dark colored to more than a depth of 48 inches, move closer to the edge of the depression until the dark soil is less than 48 inches thick. If the edge of the depression has a hydric soil indicator, all lower elevations within the depression are hydric soils.

Step 6: Determination of the Prevalence of Hydrophytic Vegetation
The Agency Expert should be cautioned that the plant community at the time of the site visit might not be reflective of conditions that would occur during normal circumstances (Step 2) or normal environmental conditions (Step 7). Even on sites where the hydrology is relatively unaltered, implementation of current and past agricultural management practices (i.e. mowing, application of herbicides, grazing, and CRP) might have had a profound effect on the plant community. In these situations, the site might be experiencing normal hydrological conditions. The plant community may or may not be reflective of normal circumstances (see Step 2). For example, for a site in a field shown to be cropped prior to December 23, 1985 and continues to be cropped but exhibits herbaceous vegetation growth the onsite vegetation should be used.

Regardless of the vegetation indicator used, ultimately a list of plants is obtained. Each plant is assigned an indicator status. By regulation [7 CFR Part 12; Section 12.31 (b)], this indicator status (assignment) is derived from the *National List of Plant Species that Occur in Wetlands: USF&WS Biological Report, May 1988 (Region 4).* The SD NRCS may access this plant list via Biology Technical Note Number 10 on the FOTG. According to the USACE Regional Supplements, the positive (+) and negative (-) sign associated with the plant indicator status are no longer used.

According to the USACE Regional Supplements, *"The evaluation of the vegetation can begin with a rapid field test for hydrophytic vegetation to determine if there is a need to collect more detailed vegetation data. The rapid test for hydrophytic vegetation (Indicator 1) is met if all dominant species across all strata are OBL or FACW, or a combination of the two, based on a visual assessment. If the site is not dominated solely by OBL and FACW species, proceed to the standard dominance test (Indicator 2), which is the basic hydrophytic vegetation indicator. Either Indicator 1 or Indicator 2 should be applied in every wetland determination… These are the only indicators that need to be considered in most situations."*

There are four hydrophytic vegetation indicators; this document only addresses the first two, if you need to use Indicator 3 or Indicator 4 then consult your USACE Regional Supplement. Indicator 1 will be used, as appropriate, regardless of the Regional Supplement County.

ACTION: Use the meandering reconnaissance method to obtain visual estimates of vegetative species and percent cover. Proceed to next Action.

- The meandering reconnaissance method may be conducted in one of two ways:
  - By walking through the entire site in a meandering fashion and document the vegetation information; or
  - By finding a nearby highpoint (where you can still identify plant species) and documenting the vegetation information.

ACTION: Select the procedure for using hydrophytic vegetation indicators as follows:

- **Apply Indicator 1 (Rapid Test for Hydrophytic Vegetation) – see below for indicator description.**
  - If the plant community passes the rapid test for hydrophytic vegetation, then the vegetation is hydrophytic and no further vegetation analysis is required. Document findings on form SD-LTP-29. Proceed to Step 7.
  - If the rapid test for hydrophytic vegetation is not met then proceed to Indicator 2.

- **Apply Indicator 2 (Dominance Test) – see below for indicator description.**
  - If the plant community passes the dominance test, then the vegetation is hydrophytic and no further vegetation analysis is required. Document findings on form SD-LTP-29. Proceed to Step 7.
  - If the plant community fails the dominance test not due to disturbance then hydrophytic vegetation is absent. Document findings on form SD-LTP-29. Proceed to Step 7.

- **Apply Reference Site**
  - If the plant community fails the dominance test due to disturbance, but indicators of hydric soil and wetland hydrology are both present. In order to use a vegetative reference site the soil map unit must be field verified. Document findings on form SD-LTP-29. Proceed to Step 7.

Indicator I Description: All dominant species across all strata are rated OBL or FACW, or a combination of these two categories, based on a visual assessment. Dominant species are selected visually from each stratum of the community using the “50/20 rule” (discussed below) as a general guide but without the need to gather quantitative data. Only the dominant species in each stratum must be recorded on form SD-LTP-29. There is no need to document the 50/20 and dominance calculations on the SD-LTP-29 for this indicator.

Indicator 2 Description: When more than 50 percent of the dominant plant species across all strata are rated OBL, FACW, or FAC (excluding FAC-) hydrophytic vegetation criteria are met. Document all identified species greater than five percent on form SD-LTP-29.

Use the “50/20 rule” described below to select dominant species from each stratum of the community. Combine dominant species across strata (i.e. herb, shrub, and tree) and apply the dominance test to the combined list. Once a species is selected as a dominant, its cover value is not used in the dominance test; each dominant species is treated equally. Thus, a plant community with seven dominant species across all strata would need at least four dominant species that are OBL, FACW, or FAC (excluding FAC−) to be considered hydrophytic by this indicator. Species that are dominant in two or more strata should be counted two or more times in the dominance test.

Selecting Dominant Species by the 50/20 Rule:
Dominant plant species are the most abundant species in the community; they contribute more to the character of the community than do the other non-dominant species present. The 50/20 rule is the recommended method for selecting dominant species from a plant community when quantitative data are available. For rapid wetland determinations in relatively simple plant communities, a qualitative assessment of dominant species is often adequate and may be more efficient and economical than more intensive vegetation sampling protocols. This option is most often applicable to plant communities that consist of nearly uniform or monotypic stands with low species diversity, low spatial heterogeneity, and abrupt boundaries between different vegetation communities or zones. In these situations, dominant species can be selected visually without invoking the 50/20 rule except as a general guide. A list of dominant species derived by the qualitative approach is adequate for the dominance test for hydrophytic vegetation (Indicator 1).

Dominant species are chosen independently from each stratum of the community. In general, dominants are the most abundant species that individually or collectively account for more than 50 percent of the total coverage of vegetation in the stratum, plus any other species that, by itself, accounts for at least 20 percent of the total. Table 1.0 provides a simple example. Refer to the USACE Regional Supplement for a multi strata example. Steps in selecting dominant species by the 50/20 rule are as follows:

1. Estimate the absolute percent cover of each species in each stratum present within the entire site. Absolute percent cover considers all of the sites vegetation but does not consider mud flats, crops, and bare ground.

2. Rank all species in the stratum from most to least abundant.

3. Calculate the total coverage of all species in the stratum (i.e., sum their individual percent cover values). Percent cover estimates do not necessarily sum to 100 percent.

4. Select plant species from the ranked list, in decreasing order of coverage, until the cumulative coverage of selected species *exceeds* 50 percent of the total coverage for the stratum. If two or more species are equal in coverage (i.e., they are tied in rank), they should all be selected. The selected plant species are all considered to be dominants. All dominants must be identified to species.

5. In addition, select any other species that, by itself, is at least 20 percent of the total percent cover in the stratum. Any such species is also considered to be a dominant and must be accurately identified.

6. Repeat steps 1-5 for any other stratum present. Combine the lists of dominant species across all strata. Note that a species may be dominant in more than one stratum (e.g., a woody species may be dominant in both the tree and sapling/shrub strata).

Table 1.0: Example of the selection of dominant species by the 50/20 rule and determination of hydrophytic vegetation by the dominance test.

Strata	Species	Percent Cover	Indicator Status	Dominant?
Herb	Eleocharis macrostachya (creeping Spikerush)	25	OBL	YES
Herb	Phalaris arundinacea (Reed Canary Grass)	20	FACW+	YES
Herb	Carex atherodes (slough sedge)	15	OBL	YES
Herb	Stachys palustris (marsh hedgenettle)	5	OBL	NO
Herb	Hordeum jubatum (foxtail barley)	5	FACW	NO
Herb	Juncus torreyi (Torrey's rush)	5	FACW	NO
		75		

Herbaceous Stratum 50/20 Thresholds
50% of Total Cover = 37.5%
20% of Total Cover = 15%
Hydrophytic Vegetation Determination:
Total number of dominant species across all strata = 6.
Percent of dominant species that are OBL, FACW, or FAC 5/6= 83%
Therefore, this community is hydrophytic by the Dominance Test

Step 7: Determination of Wetland Hydrology
Water drives all wetland ecosystems; however the influence of the water to the wetland system can differ based on physical and climatic characteristics of the site. The hydrology criteria in Part 527.4 of the NFSAM are part of the NRCS wetland delineation procedures. Remember the hydrology criteria changes for potholes/playas the site is manipulated.

If the wetland hydrology criteria can not be directly verified (e.g. gauge or well data) then indirect hydrology indicators are used to determine wetland hydrology. Full indicator descriptions with photos and notes may be found in the USACE Regional Supplements and the hydrology indicator training presentation provided in 2009 (found on the Wetland SharePoint site). There are three steps to determine wetland hydrology. The first two steps can only be used to confirm the presence of hydrology.

Any wetland hydrology indicator(s) observed during the visit must be representative of normal environmental (hydrologic) conditions. The wetland hydrology indicators observed during the visit must:

1. be reflective of the indicators that would be present during the normal wet portions (i.e. April-early June and September-early October) of the growing season, and/or
2. be a direct and/or indirect result of the hydrologic conditions outlined above.

According to Part 514.6 of the NFSAM, *"Hydrology indicators are the most ephemeral of wetland indicators. Those involving direct observation of surface water or saturated soils are usually present only during the normal wet portion of the growing season and may be absent during the dry season or during drier-than-normal years. Therefore, lack of an indicator is not evidence for the absence of wetland hydrology. Conversely, some indicators could be present on a non-wetland site immediately after a heavy rain or during a period of unusually high precipitation, river stages, runoff, or snowmelt. An understanding of normal seasonal and annual variations in rainfall, temperature, and other climatic conditions is essential in interpreting hydrology indicators."*

ACTION: Consult local weather websites and use your local experience to determine if normal hydrological conditions exist. A website that could be used to determine "observed, normal, departure from normal and percent of normal precipitation" is: http://water.weather.gov/precip/.
Once you are at this website follow these instructions:

1. Select the Timeframe (1) you wish to review. If you select "today" then you will only be able to review the "observed" product. If you select any prior data then you will be able to review all products.

2. Select the Product (2) you wish to review (Observed, Normal, Departure from Normal, or Percent of Normal).

3. Select the Location (3) you wish to review (South Dakota) and zoom in as necessary.

4. You can print and save the product map and save the website as a bookmark.

- If normal environmental conditions exist then the field indicators that occur on the site should be held with very high confidence. Proceed to next Action.

- If normal environmental conditions do not exist (i.e. dryer or wetter than what is normal, the sampling period occurs outside of the normal wet portion of the growing season) then the presence or absence of indicators should be tempered with the fact that site conditions at the time of sampling might not be reflective of what would occur during periods of normal hydrological conditions. Proceed to next Action.

Primary and/or secondary hydrology indicators that are representative of normal hydrological conditions must be documented. Refer to Attachment B for further hydrology indicator information.

ACTION: Determine if there are any Primary Indicators present. Wetland hydrology is met if one of the following Primary Indicators is present:

PRIMARY INDICATORS

(A1) Surface Water

(A2) High Water Table

(A3) Saturation

(B1) Water Marks

(B2) Sediment Deposits

(B3) Drift Deposits

(B4) Algal Mat or Crust

(B5) Iron Deposits

(B7) Inundation visible on aerial imagery*

(B9) Water-stained Leaves

(B11) Salt Crust – Great Plains counties only

(B13) Aquatic Fauna/invertebrates

(B8) Sparsely vegetated concave surface – Midwest counties only

(B14) True Aquatic Plants – Midwest counties only

(C1) Hydrogen Sulfide Odor

(C2) Dry-season water table – Great Plains Counties only - Do not use if altered (subsurface irrigation structure)

(C3) Oxidized Rhizospheres on Living Roots – Midwest counties and untilled in GP counties

(C4) Presence of Reduced Iron

(C6) Recent Iron Reduction in Tilled Soils – Midwest counties only

(C7) Thin Muck Surface

(D9) Gauge or well data – Midwest counties only

- Document all observed Primary Indicators on form SD-LTP-29. Proceed to next action.

ACTION: Determine if there are two Secondary Indicators present. Wetland hydrology is met if two of the following Secondary Indicators are present:

SECONDARY INDICATORS

(B6) Surface Soil Cracks – Do not use if altered (ponding removed in potholes; any alteration in non-potholes)

(B8) Sparsely vegetated concave surface – Great Plains counties only

(B10) Drainage Patterns

(C2) Dry-Season Water Table – Midwest counties only - Do not use if altered (subsurface irrigation structure)

(C3) Oxidized Rhizospheres on Living Roots – Great Plains counties where tilled

(C8) Crayfish Burrows

(C9) Saturation Visible on Aerial Imagery*

(D1) Stunted /Stressed Plants – Midwest counties only

(D2) Geomorphic Position – Do not use if altered (ponding removed in potholes; any alteration in non-potholes)

(D5) FAC Neutral Test – May be used on altered sites only with on-site vegetation

(D7) Frost-heave Hummocks – Great Plains counties only

- Document all observed Secondary indicators on form SD-LTP-29. If at least two Secondary Indicators are observed then proceed to Step 8.
- If two Secondary Indicators are not met in the field, proceed to next action.

<u>Hydrology Indicator Notes:</u>
*****Hydrology Step 3 is not replaced by hydrology indicators B7 and C9. Hydrology Step 3 procedures may still be used when dealing with "Difficult Wetland Situations" (e.g. Wetlands that periodically lack indicators of wetland hydrology) as is allowed in through EFH Chapter 19 tools.

*If both indicator B7 and C9 (inundation and saturation) are apparent on imagery then use indicator C9. Users must follow Step 3 procedures if they wish to use B7 or C9.

<u>Midwest USACE Regional Supplement counties in SD are:</u>

Brookings	Lincoln	Deuel	Roberts
Lake	Codington	Moody	Hamlin
Clay	Minnehaha	Grant	Union

All other counties (except MLRA 62) are within the Great Plains Regional Supplement.

ACTION: Utilize the remote sensing Procedure 2 tool outlined in Chapter 19 of Part 650 of the Engineering Field Handbook (EFH), to make the wetland hydrology determination. This procedure is documented in 650.1903 (Supplemental data for remote sensing*)* and is utilized either when offsite wetland procedures are used; or, when on-site wetland procedures are used and evidence of hydrology cannot be determined onsite with Primary or Secondary hydrology indicators. The aerial photography used in connection with this tool is the Farm Service Agency (FSA) compliance slides.

The remote sensing tool can be used to confirm the presence or absence of hydrology; however, it cannot override the presence of field indicators without clear documentation and explanation as to how the preponderance of evidence negates the on-site indicator(s) found. Additionally, the FSA slides are used to confirm the presence of wetland drainage features and wetland manipulation.

EFH Procedure 2 Steps:

1. Determine the closest NWS Climate Station (with available slide normalization data) to your sites.

   a. Utilize the latest NWS climate station zone map that is available in the SD FOTG, which spatially outlines the area closest to each station as shown below, or overlay in ArcGIS® a digital copy of the zones over the sites' locations.

2. Identify the 20-year period ending with current year.

3. Review the rainfall data sheets (available in the SD FOTG) to determine the "normal" years.

   a. The rainfall data sheets contain the monthly observed precipitation for March through September for 1980 to the current year as well as the 1971-2000 average precipitation values. The observed precipitation is compared to the 1971-2000 average precipitation for the three months preceding the aerial photography flight date to categorize each slide as "dry", "normal", or "wet", depending on the flight date.

   b. Because the normal year identification directly depends on the aerial photography flight date, it is very important that the actual date of the flight is used to determine normal years.

      i. Chapter 19, Part 650 (page 19-25), of the EFH states that an **effort should be made to determine the actual date** each photograph was taken to ensure that an accurate hydrology determination is made for each field in question.

      ii. The FSA should be contacted to see if they have flight records or if they can estimate the flight date more accurately than using the stamped date on each slide.

      iii. For 2003 and newer data, it is not necessary to contact the FSA as this data is digital and there are available digital metadata with the flight dates.

Remote Sensing Procedure 2 Hydrology Example

A typical rainfall sheet sample is shown on the next page. The normal years in the 20-year period are determined by applying the flight month and year to obtain the slides that have a slide indicator status of "NORM" or normal because only normal slides are used in the remote sensing procedure.

- For example, if the flight date is August 5, the slide indicator status shown below is "NORM"; and therefore, the 1991 slide is normal.

Typically, the previous 3 months before the month of the slide flight are used to categorize the slide; however, if the slide was flown late in the month (e.g., July 22 or later), the month of the flight should be used as one of 3 previous months.

- For example, if a photo was taken on **July 1** then April, May, and June are the 3 prior months that will be used. Therefore, **select July from the Slide Indicator Status** heading of the appropriate rainfall data sheet file because July uses the precipitation from the three previous months of April, May, and June.

- For example, if the slide was flown on **July 22 or later;** then May, June, and July are the 3 previous months that are used. Therefore, select **August from the Slide Indicator Status** heading of the appropriate rainfall data sheet file because August uses the precipitation from the three previous months of May, June, and July.

Rainfall Data
Huron WSO AP
Station #SD4127
Beadle County, SD

		Monthly Rainfall Totals in Inches							Monthly Weighted Totals					Slide Indicator Status				
	Year	March	April	May	June	July	Aug.	Sept.	June	July	Aug	Sept.	Oct.	June	July	Aug	Sept.	Oct.
1	1980	0.81	0.82	1.68	5.31	3.21	3.94	0.91	7.49	20.11	21.93	23.55	13.82	DRY	NORM	WET	WET	NORM
2	1981	1.90	0.24	0.68	1.48	2.24	4.63	1.28	4.42	6.04	10.36	19.85	15.34	DRY	DRY	DRY	WET	NORM
3	1982	1.60	1.29	4.58	1.25	5.10	2.85	3.49	17.92	14.20	22.38	20.00	21.27	NORM	NORM	WET	WET	WET
4	1983	2.35	1.14	1.37	4.62	2.22	0.45	1.27	8.74	17.74	17.27	10.41	6.93	DRY	NORM	NORM	NORM	DRY
5	1984	1.50	2.83	2.52	11.49	1.81	3.55	3.36	14.72	42.34	30.93	25.76	18.99	NORM	WET	WET	WET	WET
6	1985	3.86	1.57	2.03	2.36	4.67	2.57	1.06	13.09	12.71	20.76	19.41	12.99	NORM	NORM	NORM	WET	NORM
7	1986	1.56	5.08	3.15	2.50	6.44	2.84	0.42	21.17	18.88	27.47	23.90	13.38	WET	NORM	WET	WET	NORM
8	1987	4.78	0.42	2.34	1.54	2.19	2.98	0.42	12.64	9.72	11.99	14.86	9.41	NORM	DRY	NORM	NORM	NORM
9	1988	0.88	2.06	5.58	0.77	1.44	2.13	0.09	21.74	15.53	11.44	10.04	5.97	WET	NORM	NORM	NORM	DRY
10	1989	2.17	1.60	1.00	3.19	1.14	1.25	0.26	8.37	13.17	10.80	9.22	4.42	DRY	NORM	DRY	DRY	DRY
11	1990	1.31	1.92	6.28	6.34	3.51	0.72	1.27	23.99	33.50	29.49	15.52	8.76	WET	WET	WET	NORM	NORM
12	1991	0.62	5.59	3.72	5.72	1.76	1.18	0.98	22.96	30.19	20.44	12.78	7.06	WET	WET	NORM	NORM	DRY
13	1992	0.86	2.10	0.33	5.43	4.86	2.78	0.39	6.05	19.05	25.77	23.49	11.59	DRY	NORM	WET	WET	NORM
14	1993	1.57	3.18	3.32	7.12	6.69	2.39	0.63	17.89	31.18	37.63	27.67	13.36	NORM	WET	WET	WET	NORM
15	1994	0.27	2.75	1.67	5.12	2.95	1.27	2.02	10.78	21.45	20.76	14.83	11.55	NORM	NORM	NORM	NORM	NORM
16	1995	3.25	5.31	6.40	2.20	2.87	3.19	2.33	33.07	24.71	19.41	17.51	16.24	WET	WET	NORM	NORM	WET
17	1996	0.62	0.21	4.75	1.78	1.79	2.41	3.69	15.29	15.05	13.68	12.59	17.68	NORM	NORM	NORM	NORM	WET
18	1997	0.16	2.70	2.38	3.08	6.30	1.42	3.87	12.70	16.70	27.44	19.94	20.75	NORM	NORM	WET	WET	WET
19	1998	2.54	1.91	4.06	3.02	1.82	1.80	0.00	18.54	19.09	15.56	12.06	5.42	NORM	NORM	NORM	NORM	DRY
20	1999	0.25	3.24	2.87	3.00	1.30	2.56	2.10	15.34	17.98	12.77	13.28	12.72	NORM	NORM	NORM	NORM	NORM
21	2000	0.35	2.61	4.43	2.92	3.22	1.20	0.44	18.86	20.23	19.93	12.96	6.94	NORM	NORM	NORM	NORM	DRY
22	2001	0.78	6.64	2.41	5.03	2.59	1.08	1.73	21.29	26.55	20.24	13.45	9.94	WET	WET	NORM	NORM	NORM
23	2002	1.73	1.58	1.32	1.28	0.84	3.66	0.72	8.85	8.06	6.40	13.94	10.32	DRY	DRY	DRY	NORM	NORM
24	2003	0.27	1.58	2.61	4.04	1.28	1.49	1.60	11.26	18.92	14.53	11.07	9.06	NORM	NORM	NORM	NORM	NORM
25	2004	1.98	1.91	3.58	3.33	4.44	3.10	5.54	16.54	19.06	23.56	21.51	27.26	NORM	NORM	WET	WET	WET
26	2005	0.38	0.67	2.81	5.58	1.4	2.52	6.67	10.15	23.03	18.17	15.94	26.45	NORM	WET	NORM	NORM	WET
27	2006	1.04	1.65	1.69	1.56	0.46	4.47	4.59	9.41	9.71	6.19	15.89	23.17	NORM	DRY	DRY	NORM	WET
28	2007	2.08	1.92	7.41	6.23	0.20	6.47	1.01	28.15	35.43	20.47	26.04	16.17	WET	WET	NORM	WET	WET
29	2008	1.49	2.05	2.26	4.05	2.47	2.79	3.27	12.37	18.72	17.77	17.36	17.86	NORM	NORM	NORM	NORM	WET
30	2009	1.68	1.07	2.16	4.35	3.06	1.46	2.71	10.30	18.44	20.04	14.85	14.11	NORM	NORM	NORM	NORM	NORM
31	2010	no data	no data	no data	no data	no data	no data	no data	######	######	######	######	######	######	#######	#######	#######	#######
32	2011	no data	no data	no data	no data	no data	no data	no data	######	######	######	######	######	######	#######	#######	#######	#######
33	2012	no data	no data	no data	no data	no data	no data	no data	######	######	######	######	######	######	#######	#######	#######	#######

Month	30% Lower Bound	N	30% Upper Bound
March	0.73	1.67	2.01
April	1.37	2.29	3.00
May	1.82	3.00	3.78
June	1.90	3.28	3.73
July	1.78	2.86	3.41
August	1.44	2.07	2.74
Sept.	0.94	1.80	2.39
Jun-MAM	8.93	15.25	19.35
Jul-JMA	10.71	18.13	21.75
Aug-JJM	10.96	18.14	21.47
Sep-AJJ	9.78	15.21	18.77
Oct-SAJ	7.48	12.40	16.06

Normals are for 1971-2000 data

March	1.67
April	2.29
May	3.00
June	3.28
July	2.86
August	2.07
Sept.	1.80

4. Review the normal year slides to document the remotely observed wetland hydrology at each site. At a minimum use five normal year slides. However, more normal years are preferred in order to meet the "preponderance of evidence" requirement. The following signatures are indicators of potential wetland hydrology and should be documented on form SD-LTP-28. Refer to Attachment C for examples of wetness signatures.
   - Hydrophytic vegetation (document as Color tone difference (CT)
   - Surface water (documented as Inundation (INU)
   - Saturated conditions (document as CT)
   - Flooded or drowned-out crops (document as CT)
   - Stressed crops due to wetness (document as CT)
   - Differences in vegetation due to different planting dates (documented as CT)
   - Inclusion of wet areas as set-aside or idled (documented as No crop (NC))
   - Circular or irregular areas of unharvested crops in a harvested field (document as CT)
   - Isolated areas that are not farmed with the rest of the field (documented as NC)
   - Areas of greener vegetation (especially during dry years) (documented as CT)

5. Count the normal-year slides with wetland signatures and divide by the total number of normal years in the sample set to calculate the wetland signature percentages for each site. Document these percentages on form SD-LTP-28.

- If offsite wetland procedures are applicable (see Step 4), proceed to Step 8.

- If utilizing onsite wetland procedures and the wetness signatures are apparent for at least 50 percent of all normal year slides, then hydrology is verified. Document on form SD-LTP-28 and form SD-LTP-29. Proceed to Step 8.

- If utilizing onsite wetland procedures and the wetness signatures are NOT apparent for at least 50 percent of all normal year slides, then hydrology is NOT verified. Document on form SD-LTP-28 and form SD-LTP-29. Proceed to Step 8.

Step 8: Making a Wetland Determination

ACTION: Sites determined to be a wetland will be assigned the appropriate wetland label, as determined by any applicable exemptions found in the current version of the NFSAM.

- Additional analysis (i.e. duration of ponding or saturation, cropping history, if production is possible) might be required to determine the appropriate label. Refer to 7 CFR Part 12; Section 12.5 (b) *Wetland Exemptions* and Parts 514.10 through 514.60 of the NFSAM (current edition) for further guidance assigning FSA wetland labels.

- Verify and document the scope and effect for all manipulated sites, excluding sites labeled "NW/PC" using Step 4 offsite procedures. Document scope and effect on forms SD-LTP-14, SD-LTP-15, or SD-LTP-11.

- If there is a question regarding the existence or extent of a manipulation, the following resources should be used to verify the presence or absence of a manipulation:
  - FSA slides from 1986 and earlier
  - Black and white photography (from the field office)
  - Field verified scope and effect documentation completed in 1990-1991

- If the site is a potential converted wetland then also conduct a minimal effect analysis prior to labeling the site CW or CW + year.

- Proceed to next Action

ACTION: Large rangeland tracts, or portions thereof, that are not inventoried (NI) for potential wetlands will be outlined and labeled with an "NI".

- Proceed to next Action

ACTION: Determine if indicators of potential waters of the U.S. exist on your determination area. The indicators of potential waters of the U.S. are:
  - Open water, dry lake/pond beds, or mud flats on photos
  - Drainage patterns evident on available inventory tools.
  - Blue lines or similar designations on United States Geological Survey (USGS) topographic maps and other maps.
  - Features on maps labeled as stream, lake, river, creek, gulch, arroyo, etc.

- Potential waters of the U.S. should be labeled “NI”. Verify in the field if the NI channel has adjacent associated wetlands and map accordingly (e.g. NI/W, NI/PC). See Attachment D for “NI” examples.

- Proceed to next action.

ACTION: Consider participant provided information.

- Ensure that you have coordinated with the participant requesting the determination and obtained verbal statements and written documentation, as necessary. This information may be useful for wetland label assignments.

Following the wetland determination and assignment of the appropriate wetland label for each site proceed to Step 9.

Step 9: Wetland Delineation

The NRCS wetland delineation and determination is unique, as it does not only involve separating areas meeting the wetland definition from those areas not meeting the definition, but requires providing the appropriate wetland label based on exemptions provide for in 7 CFR Part 12.5. The final product is a certified wetland determination (form NRCS-CPA-026e, Highly Erodible Land and Wetland Conservation Determination) and wetland map.

Depending on the purpose of the project and the participant’s desires, sites may need to be identified in the field with survey tape, stakes, or other markers. Certified wetland determination maps are typically derived from aerial photography. However, the use of Global Positioning System (GPS) data in some situations may provide for a higher resolution and confidence.

A determination map labeled with the NFSAM label and acres for each site and a document listing the NFSAM label and acres for each label is required. Agency Experts are required to use the most current version of the Wetland Tool in GIS as this tool will provide the two documents in a technically consistent manner. Agency Experts must ensure that they are using the correct symbology (e.g. font size, colors, etc) and layout. Additionally, Agency Experts must ensure that they use only the currently approved NFSAM labels. Previous labels may appear in the Wetland Tool and/or in the NRCS-CPA-026e. However, these labels are included because previous determinations may have allowed the use of different labels.

ATTACHMENT A

MUNSELL SOIL HELP CHARTS

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Munsell Soil Help Charts

In general, start with Soil Color Chart pages 10YR, 2.5Y, and 5Y.
10YR is used in the examples below

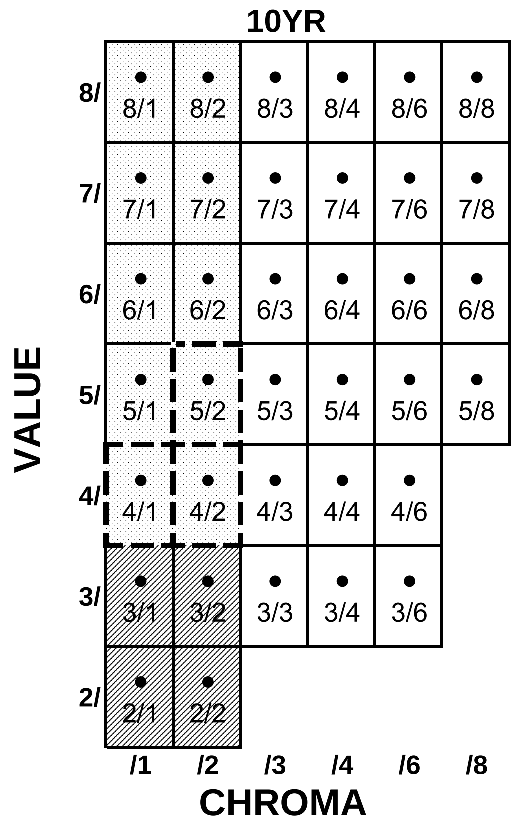
A11: Depleted Below Dark Surface

Upper layer above depleted matrix has a value <u><</u>3 and chroma <u><</u>2 (<u><</u>1 for sandy soils).

AND

Starting within 12 inches of the surface, a layer at least 6 inches thick with a depleted "grayer" color of value <u>></u>4 and chroma <u><</u>2.

IF the soil color in the depleted layer are 4/1, 4/2, or 5/2 then redox concentrations are required.



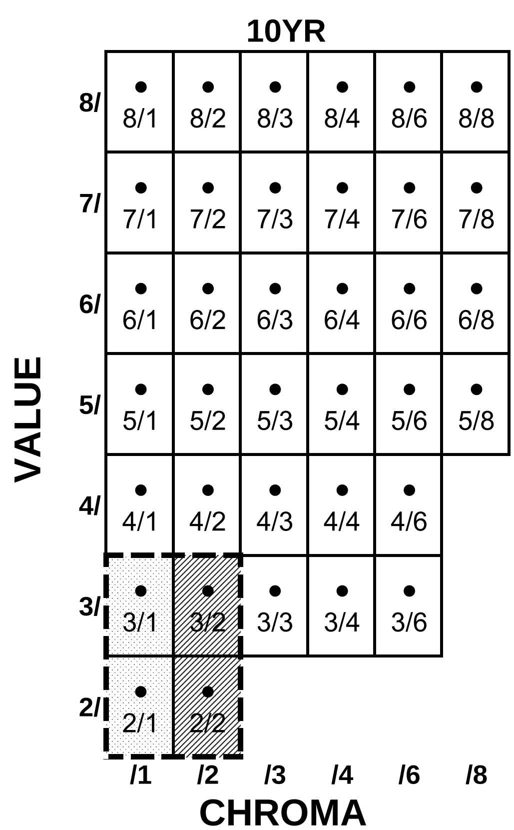
F6: Redox Dark Surface

Entirely within 12 inches of the surface there is a layer of value <u><</u>3 and chroma <u><</u>2 at least 4 inches thick with redox concentrations.

AND

2% or more redox concentrations if value <u><</u>3 and chroma <u><1</u>.

5% or more redox concentrations if value <u><</u>3 and chroma <u><2</u>.



Munsell Soil Help Charts

In general, start with Soil Color Chart pages 10YR, 2.5Y, and 5Y.
10YR is used in the examples below

A12: Thick Dark Surface

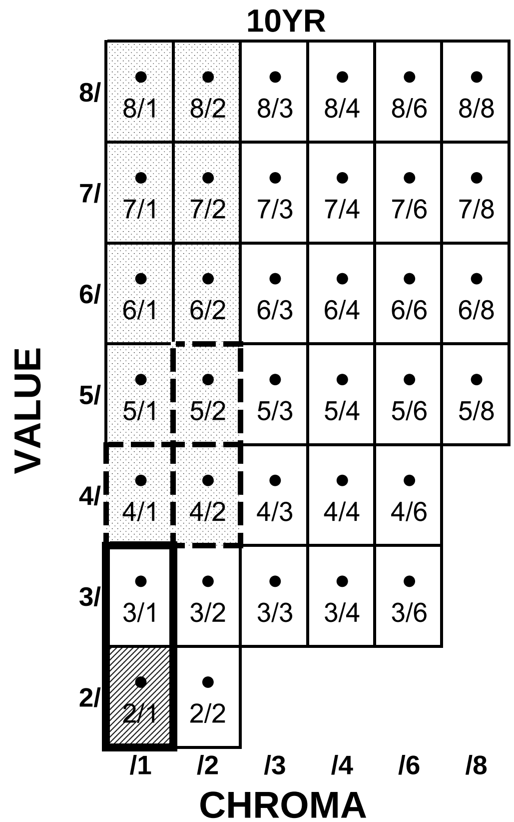
Upper 12 inches has value ≤2.5 and chroma ≤1.

AND

A layer at least 6 inch thick with depleted "greyer" color of value ≥4 and chroma of ≤2 starting anywhere 12 inches below the surface.

IF the soil color in the depleted layer are 4/1, 4/2, or 5/2 then redox concentrations are required.

Any layer between the two (surface & depleted layer) has value ≤3 and chroma ≤1.



ATTACHMENT B

HYDROLOGY INDICATOR CAUTIONS AND USERS NOTES

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Wetland Hydrology Field Indicators

Read the Indicator Information!!

Especially the Caution

and

User's Notes!!!

ftp://ftp-fc.sc.egov.usda.gov/SD/Wetland%20Folder/Indicator_Descriptions

Three criteria needed to be a wetland

- Wetland Plants
- Wetland Soils
- Enough hydrology to support hydrophytic vegetation (the wetland plants).

- Wetland Hydrology Indicators provide evidence that areas inundated with water or soil saturated with water are occurring repeatedly over a period of years during the growing season and reflect long term history.

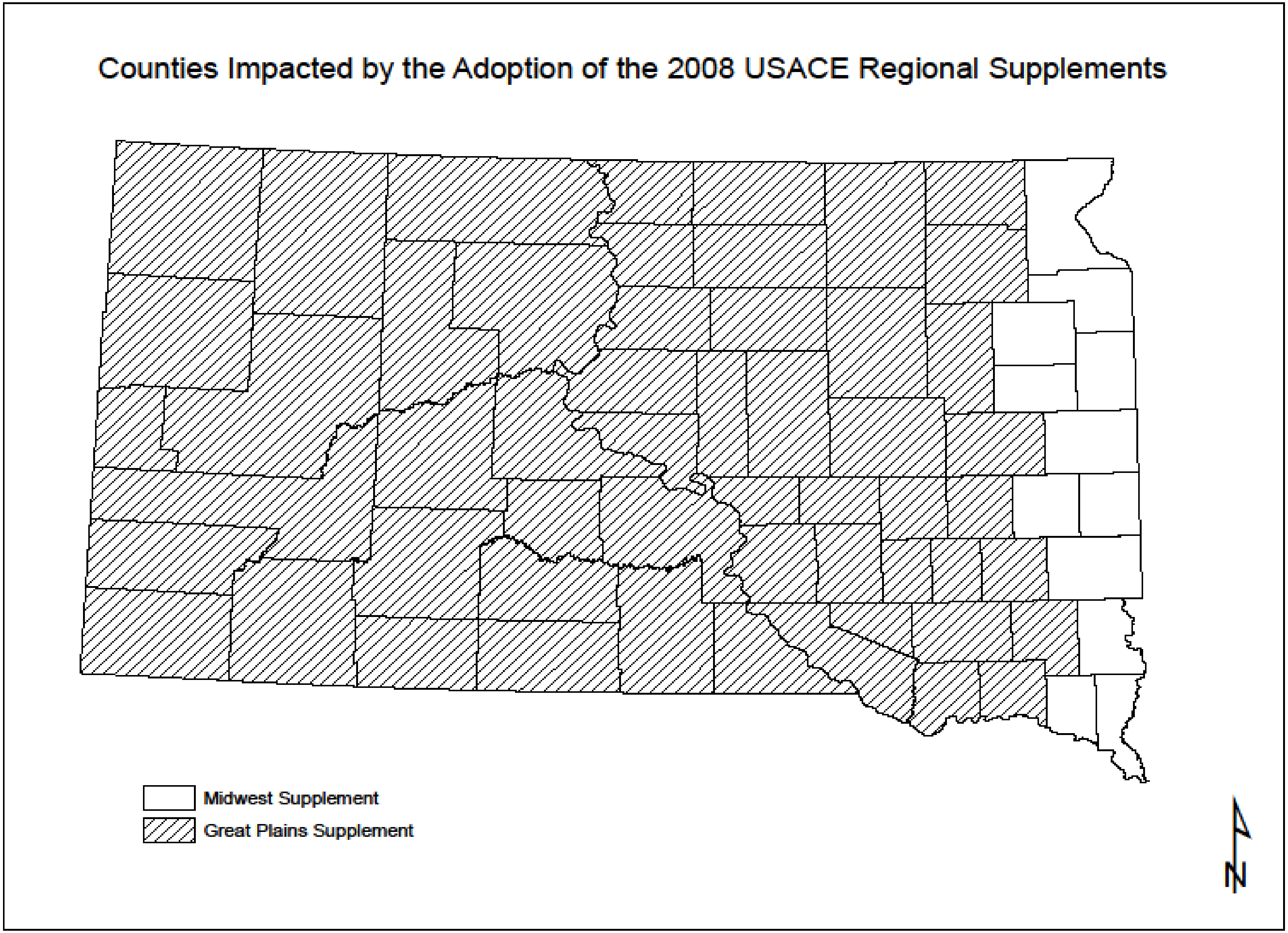
- If the area is **not a pothole, playa, or pocosin AND IS HYDROLOGICALLY ALTERED** it has to be **inundated** for at least 15 consecutive days during the growing season or 10% of the growing season, whichever is less, in most years (50% chance or more)

Primary Indicators versus Secondary Indicators

- You need one primary hydrology indicator to verify hydrology.
- If you can’t find a primary indicator then two secondary indicators are needed.
- Don’t forget to document ALL hydrology indicators observed on site.

Hydrology Indicators (new indicators on left)

Algal mat or crust	FAC-neutral Test
Aquatic fauna	Oxidized Root Channels
Crayfish burrows	Water-stained Leaves
Dry-season water table	Drainage Patterns
Frost-heave hummocks	Drift Deposits (lines)
Gauge or well data	Saturation
Geomorphic position	Sediment Deposits
High water table	Surface Water (Inundation)
Hydrogen sulfide odor	Water Marks
Inundation visible on aerial imagery	
Iron deposits	
Presence of reduced iron	
Recent iron reduction in tilled soils	
Salt crusts	
Saturation visible on aerial imagery	
Sparsely vegetated concave surface	
Stunted or Stressed Plants	
Surface soil cracks	
Thin muck surface	
True aquatic plants	


Counties Impacted by the Adoption of the 2008 USACE Regional Supplements
Midwest Supplement
Great Plains Supplement
N

Great Plains Regional Supplement Hydrology Indicators

Indicator ID	Indicator Name	Primary	Secondary	Can this indicator be used on altered sites?	Is this indicator only used during the growing season?
A1	Surface Water (Inundation)	X		Yes	No
A2	High water table	X		Yes	No
A3	Saturation	X		Yes	No
B1	Water Marks	X		Yes	No
B2	Sediment Deposits	X		Yes	No
B3	Drift Deposits (lines)	X		Yes	No
B4	Algal mat or crust	X		Yes	No
B5	Iron deposits	X		Yes	No
B6	Surface soil cracks		X	**No, see notes**	No
B7	Inundation visible on aerial imagery	X		Yes	No
B8	Sparsely vegetated concave surface		X	Yes	**Yes**
B9	Water-stained Leaves	X		Yes	No
B10	Drainage Patterns		X	Yes	No
B11	Salt crusts	X		Yes	No
B13	Aquatic fauna	X		Yes	No
C1	Hydrogen sulfide odor	X		Yes	No
C2	Dry-season water table	X		**No, see notes**	**Yes**
C3	Oxidized Root Channels	X (untilled)	X (tilled)	Yes	No
C4	Presence of reduced iron	X		Yes	No
C7	Thin muck surface	X		Yes	No
C8	Crayfish burrows		X	Yes	No
C9	Saturation visible on aerial imagery		X	Yes	No
D2	Geomorphic position		X	**No, see notes**	No
D5	FAC-neutral Test		X	Yes	No
D7	Frost-heave hummocks		X	Yes	No

Midwest Regional Supplement Hydrology Indicators

Indicator ID	Indicator Name	Primary	Secondary	Can this indicator be used on altered sites?	Is this indicator only used during the growing season?
A1	Surface Water (Inundation)	X		Yes	No
A2	High water table	X		Yes	No
A3	Saturation	X		Yes	No
B1	Water Marks	X		Yes	No
B2	Sediment Deposits	X		Yes	No
B3	Drift Deposits (lines)	X		Yes	No
B4	Algal mat or crust	X		Yes	No
B5	Iron deposits	X		Yes	No
B6	Surface soil cracks		X	**No, see notes**	No
B7	Inundation visible on aerial imagery	X		Yes	No
B8	Sparsely vegetated concave surface	X		Yes	**Yes**
B9	Water-stained Leaves	X		Yes	No
B10	Drainage Patterns		X	Yes	No
B13	Aquatic fauna	X		Yes	No
B14	True Aquatic plants	X		Yes	No
C1	Hydrogen sulfide odor	X		Yes	No
C2	Dry-season water table		X	**No, see notes**	**Yes**
C3	Oxidized Root Channels	X		Yes	No
C4	Presence of reduced iron	X		Yes	No
C6	Recent iron reduction in tilled soils	X		Yes	No
C7	Thin muck surface	X		Yes	No
C8	Crayfish burrows		X	Yes	No
C9	Saturation visible on aerial imagery		X	Yes	No
D1	Stunted or Stressed Plants		X	Yes	No
D2	Geomorphic position		X	**No, see notes**	No
D5	FAC-neutral Test		X	Yes	No
D9	Gauge or well data	X		Yes	No

Group A – Observation of surface water or saturated soils

- A1 – Surface water – ponding or flooding observed during site visit

- A2- High water table – observed water table within 12” of surface

- A3 – Saturation – observed within 12” of surface

ALWAYS Be aware of current weather conditions, drought or wetness

A1: Surface water – ponding or flooding observed during site visit

PRIMARY – GP & MW

Figure 23. Wetland with surface water present.

NO CHANGE

A2: High water table – observed water table within 12” of surface

NEW
PRIMARY – GP & MW

Figure 24. High water table observed in a soil pit.

A3: Saturation – observed within 12” of surface

PRIMARY – GP & MW

Figure 25. Water glistens on the surface of a saturated soil sample.

NO CHANGE

Group B – Evidence of Recent Inundation

- B1 - Water marks
- B2 - Sediment deposits
- B3 – Drift deposits
- B4 – Algal mat or crust
- B5 – Iron deposits
- B6 – Surface soil cracks
- B7 – Inundation visible on aerial imagery
- B8 – Sparsely vegetated concave surface
- B9 – Water-stained leaves
- B10 – Drainage patterns
- B11 – Salt crust
- B13 – Aquatic invertebrates/fauna – shells
- B14 – True aquatic plants

B1: Watermarks

PRIMARY – GP & MW

NO CHANGE

Figure 26. Water marks (dark stains) on trees in a seasonally flooded wetland.

General Description: Water marks are discolorations or stains on the bark of woody vegetation, rocks, bridge supports, buildings, fences, or other fixed objects as a result of inundation (Figure 26).

Cautions and User Notes: When several water marks are present, the highest reflects the maximum extent of inundation. Water marks indicate a water-level elevation and can be extrapolated from nearby objects across lower elevation areas. **Use caution with water marks that may have been caused by extreme, infrequent, or very brief flooding events.** In regulated systems, such as reservoirs, water-level records can be used to distinguish unusually high pools from normal operating levels.

B2: Sediment Deposits

Cautions and User Notes: Sediment deposits most often occur in riverine backwater and ponded situations where water has stood for sufficient time to allow suspended sediment to settle. Sediment deposits may remain for a considerable period before being removed by precipitation or subsequent inundation. Sediment deposits on vegetation or other objects indicate the minimum inundation level. This level can be extrapolated across lower elevation areas. **Use caution with sediment left after infrequent high flows or very brief flooding events.** This indicator does not include thick accumulations of sand or gravel in fluvial channels that may reflect historic flow conditions or recent extreme events. **Use caution in areas where silt and other material trapped in the snowpack may be deposited directly on the ground surface during spring thaw.**

Figure 27. Silt deposit left after a recent high-water event forms a tan coating on these tree trunks (upper edge indicated by the arrow).

General Description: Sediment deposits are thin layers or coatings of fine-grained mineral material (e.g., silt or clay) or organic matter (e.g., pollen), sometimes mixed with other detritus, remaining on tree bark (Figure 27), plant stems or leaves, rocks, and other objects after surface water recedes.

PRIMARY – GP & MW

NO CHANGE

B3: Drift Deposits **NO CHANGE**

General Description: Drift deposits consist of rafted debris that has been deposited on the ground surface or entangled in vegetation or other fixed objects. Debris consists of remnants of vegetation (e.g., branches, stems, and leaves), manmade litter, or other waterborne materials. Drift material may be deposited at or near the high water line in ponded or flooded areas, piled against the upstream side of trees, rocks, and other fixed objects (Figure 28), or widely distributed within the dewatered area.

Cautions and User Notes:
Deposits of drift material are often found adjacent to streams or other sources of flowing water in wetlands.
They also occur in tidal marshes, along lake shores, and in other ponded areas (e.g. semi-permanent or wetter). The elevation of a drift line can be extrapolated across lower elevation areas. Use caution with drift lines that may have been caused by extreme, infrequent, or very brief flooding events, including areas with functioning tile drains. Use caution as drift material can persist for many years in a dry climate. **Use caution with drift lines caused by wave action and recent hard rains.**

PRIMARY – GP & MW

Figure 28. Drift deposit on the upstream side of a sapling in a floodplain wetland.

B4: Algal mat or crust

NEW PRIMARY – GP & MW

General Description: This indicator consists of a mat or dried crust of algae, perhaps mixed with other detritus, left on or near the soil surface after dewatering.

Figure 29. Dried algal deposit clinging to low vegetation.

Figure 30. Dried crust of blue-green algae on the soil surface.

Cautions and User Notes: Algal deposits include those produced by green algae (Chlorophyta) and blue-green algae (cyanobacteria). They may be attached to low vegetation or other fixed objects, or may cover the soil surface (Figure 29). Dried crusts of blue-green algae may crack and curl at plate margins (Figure 30). Algal deposits are usually seen in seasonally ponded areas, lake fringes, and low-gradient stream margins. They reflect prolonged wet conditions sufficient for algal growth and development.

B4: Algal mat or crust continued

B5: Iron deposits

NEW PRIMARY – GP & MW

Figure 31. Iron sheen on the water surface may be deposited as an orange or yellow crust after dewatering.

Figure 32. Iron deposit (orange streaks) in a small channel.

General Description: This indicator consists of a thin orange or yellow crust or gel of oxidized iron on the soil surface or on objects near the surface.

Cautions and User Notes: Iron deposits form in areas where reduced iron discharges with groundwater and oxidizes upon exposure to air. The oxidized iron forms a film or sheen on standing water (Figure 31) and an orange or yellow deposit (Figure 32) on the ground surface after dewatering.

B6: Surface soil cracks

NEW Secondary – GP & MW

General Description: Surface soil cracks consist of shallow cracks that form when fine-grained mineral or organic sediments dry and shrink, often creating a network of cracks or small polygons (Figure 37).

Cautions and User Notes: Surface soil cracks are often seen in fine sediments and in areas where water has ponded long enough to destroy surface soil structure in depressions, lake fringes, and floodplains. Use caution, however, as they may also occur in temporary ponds and puddles in non-wetlands; these situations are easily distinguished by the absence of hydrophytic vegetation and/or hydric soils. **DO NOT USE in areas that have been effectively drained ALTERED TO THE BOTTOM).** This indicator does not include deep cracks due to shrink-swell action in clay soils (e.g., Vertisols).

Figure 37. Surface soil cracks in a seasonally ponded depression.

B7: Inundation visible on aerial imagery

NEW

Primary – GP & MW

General Description: One or **More** recent aerial photographs or satellite images show the site to be inundated.

Cautions and User Notes: Care must be used in applying this indicator because surface water may be present on a non-wetland site immediately after a heavy rain or during periods of unusually high precipitation, runoff, tides, or river stages. See Chapter 5 for procedures to evaluate the normality of precipitation prior to the photo date. Surface water observed during the non-growing season may be an acceptable indicator if experience and professional judgment suggest that wet conditions normally extend into the growing season for sufficient duration in most years. Surface water may be absent from a wetland during the normal dry season or during extended periods of drought. Even under normal rainfall conditions, some wetlands do not become inundated or saturated every year (i.e., wetlands are inundated or saturated at least 5 out of 10 years, or 50 percent or higher probability). If available, it is recommended that multiple years of photography be evaluated. If 5 or more years of aerial photography are available, the procedure described by the USDA Natural Resources Conservation Service (1997, section 650.1903) is recommended (see Chapter 5, section on Wetlands that Periodically Lack Indicators of Wetland Hydrology, for additional information). **Use caution if inundation may be due to lack of maintenance. If there is a hydrologic alteration then verify the system is functioning to its original capacity.**

NOTE: This IS THE SAME as the SDMC Hydrology Step 3 because of Chapter 5 Hydrology Procedure 3f (FSA slide review).

B8: Sparsely vegetated concave surface

NEW Primary – MW

NEW Secondary –GP

General Description: On concave land surfaces (e.g., depressions and swales), the ground surface is either unvegetated or sparsely vegetated (less than 5 percent ground cover) due to long-duration ponding during the growing season (Figure 38).

Cautions and User Notes: Ponding during the growing season can limit the establishment and growth of ground-layer vegetation. Sparsely vegetated concave surfaces should contrast with vegetated and convex surfaces in the same area. A woody overstory of trees or shrubs may or may not be present. Examples vary by region but may include concave positions on floodplains, potholes, seasonally ponded depressions in forested areas and swales in sandhills, and some playa lakes. Use caution in areas where stunting of plants on non-wetland sites may be caused by low soil fertility, excessively drained soils, salinity, cold temperatures, or other factors not related to wetness.

Figure 38. A sparsely vegetated, seasonally ponded depression.

Figure 33. A sparsely vegetated, seasonally ponded depression.

B9: Water-stained leaves

General Description: Water-stained leaves are fallen or recumbent dead leaves that have turned grayish or blackish in color due to inundation for long periods.

Cautions and User Notes: Water-stained leaves are usually found in depressional wetlands and along streams in shrub-dominated or forested habitats; however, they also occur in herbaceous communities. Staining often occurs in leaves that are in contact with the soil surface while inundated for long periods. Water-stained leaves maintain their blackish or grayish colors when dry (Figure 33). They should contrast strongly with fallen leaves in nearby non-wetland landscape positions.

Primary – GP & MW

NO CHANGE

Figure 33. Water-stained leaves in a temporarily ponded depression.

B10: Drainage Patterns

General Description: This indicator consists of flow patterns visible on the soil surface or eroded into the soil, low vegetation bent over in the direction of flow, absence of leaf litter or small woody debris due to flowing water, and similar evidence that water flowed across the ground surface.

Cautions and User Notes: Drainage patterns are usually seen in areas where water flows broadly over the surface and is not necessarily confined to a channel, such as in areas adjacent to streams (Figure 38), in seeps, and swales that convey surface water. Use caution in areas subject to high winds or affected by recent unusual flooding events, and in **grassed waterways in upland agricultural areas.**

Secondary – GP & MW

NO CHANGE

Figure 39. Vegetation bent over in the direction of water flow across a stream terrace.

B11: Salt Crust

General Description: Salt crusts are hard or brittle deposits of salts formed on the ground surface due to the evaporation of saline surface water.

Cautions and User Notes: Hard or brittle salt crusts form in arid and semi-arid regions in ponded depressions, seeps, and lake fringes when saline surface waters evaporate (Jones 1965; Boettinger 1997) (Figure 34). This indicator does not include fluffy or powdery salt deposits or efflorescences resulting from capillary rise and evaporation of saline groundwater that may be derived from a deep water table.

NEW Primary– GP

Figure 34. A hard salt crust on plant stems and the soil surface in a seasonally ponded area.

B13: Aquatic Fauna / Invertebrates

General Description: Presence of numerous live individuals, diapausing insect eggs or crustacean cysts, or dead remains of aquatic invertebrates, such as clams, snails, insects, ostracods, shrimp, and other crustaceans, either on the soil surface or clinging to plants or other emergent objects (Figures 35 and 36).

Cautions and User Notes: Examples of dead remains include clam shells, chitinous exoskeletons, insect head capsules, and aquatic snail shells. **Invertebrates or their remains should be reasonably abundant; one or two individuals are not sufficient.** Use caution in areas where invertebrate remains may have been transported by high winds, unusually high water, or other animals into non-wetland areas. Shells and exoskeletons are resistant to tillage but may be moved by equipment beyond the boundaries of the wetland. They may also persist in the soil for years after dewatering.

NEW Primary– GP & MW

Gilled snail shells have their opening on the right side of the shell.

Figure 35. Shells of aquatic snails in a seasonally ponded fringe wetland.

B14: True Aquatic Plants

General Description: This indicator consists of **the presence of live individuals or dead remains** of true aquatic plants.

Cautions and User Notes: True aquatic plants are species that are normally submerged, have floating leaves or stems, require water for support, or desiccate in the absence of standing water. Examples in the region include watershield (*Brasenia schreberi*), water-milfoil (*Myriophyllum* spp.), cow-lily (*Nuphar luteum*), water-lily (*Nymphaea* spp.), American lotus (*Nelumbo lutea*), pondweeds (*Potamogeton* spp.), bladderworts (*Utricularia* spp.), and duckweeds (*Lemna* spp.) (Figure 36).

NEW Primary–MW

Figure 36. Dried remains of water-lilies in a semipermanently ponded wetland.

Group C – Evidence of Current or Recent Soil Saturation

- C1 – Hydrogen sulfide odor
- C2 – Dry season water table
- C3 – Oxidized rhizospheres along living roots
- C4 – Presence of reduced iron
- C6 – Recent iron reduction in tilled soils
- C7 – Thin muck surface
- C8 – Crayfish burrows
- C9 – Saturation visible on aerial imagery

C1: Hydrogen Sulfide Odor

NEW Primary– GP & MW

General Description: A hydrogen sulfide (rotten egg) odor **within 12 in. (30 cm) of the soil surface**.

Cautions and User Notes: Hydrogen sulfide is a gas produced by soil microbes in response to prolonged saturation in soils where oxygen, nitrogen, manganese, and iron have been largely reduced and there is a source of sulfur. For hydrogen sulfide to be detectable, the soil must be saturated at the time of sampling and must have been saturated long enough to become highly reduced. These soils are often permanently saturated and anaerobic at or near the surface.

To apply this indicator, dig the soil pit no deeper than 12 in. to avoid release of hydrogen sulfide from deeper in the profile. Hydrogen sulfide odor serves as both an indicator of hydric soil and wetland hydrology. This observation proves that the soil meets the definition of a hydric soil (i.e., anaerobic in the upper part), plus has an ongoing wetland hydrologic regime. Often these soils have a high water table (wetland hydrology indicator A2), but the hydrogen sulfide odor provides further proof that the soil has been saturated for a long time.

C2: Dry-season Water Table

NEW Primary– GP Secondary - MW

General Description: Visual observation of the water table between 12 and 24 in. (30 and 60 cm) below the surface during the normal dry season or during a drier-than-normal year.

Cautions and User Notes: Due to normal seasonal fluctuations, water tables in wetlands often drop below 12 in. during the summer dry season. A water table between 12 and 24 in. during the dry season, or during an unusually dry year, indicates a normal wet-season water table within 12 in. of the surface. Sufficient time must be allowed for water to drain into a newly dug hole and to stabilize at the water-table level. The required time will vary depending upon soil texture. In some cases, the water table can be determined by examining the wall of the soil pit and identifying the upper level at which water is seeping into the pit. For an accurate determination of the water-table level, the soil pit, auger hole, or well should not penetrate any restrictive soil layer capable of perching water near the surface. Water tables in wetlands often drop well below 24 in. during dry periods. Therefore, a dry-season water table below 24 in. does not necessarily indicate a lack of wetland hydrology.

SD will use July and August as dry-season months; users will not need to calculate dry-season dates or determine drought periods.

This indicator does not apply in agricultural areas that have controlled drainage structures for subsurface irrigation.

C3: Oxidized Rhizospheres Along Living Roots

Modified:

1) **Always PRIMARY in the MW.**
2) **Primary in GP when not tilled.**
3) **Secondary in GP when tilled.**

General Description: Presence of a layer containing 2 percent or more iron-oxide coatings or plaques on the surfaces of living roots and/or ironoxide coatings or linings on soil pores immediately surrounding living roots within 12 in. (30 cm) of the soil surface (Figure 41).

Cautions and User Notes: Oxidized rhizospheres are the result of oxygen leakage from living roots into the surrounding anoxic soil, causing oxidation of ferrous iron present in the soil solution. They are evidence of saturated and reduced soil conditions during the plant's lifetime. Iron concentrations or plaques may form on the immediate root surface or may coat the soil pore adjacent to the root. In either case, the oxidized iron must be associated with living roots to indicate contemporary wet conditions and to distinguish these features from other pore linings. **Care must be taken to distinguish iron-oxide coatings from organic matter associated with plant roots.** Viewing with a hand lens may help to distinguish mineral from organic material and to identify oxidized rhizospheres along fine roots and root hairs. Iron coatings sometimes show concentric layers in cross section and may transfer iron stains to the fingers when rubbed. Note the location and abundance of oxidized rhizospheres in the soil profile description or remarks section of the data form. There is no minimum thickness requirement for the layer containing oxidized rhizospheres. Oxidized rhizospheres must occupy at least 2 percent of the volume of the layer.

In the GP region, oxidized rhizospheres are a secondary indicator in areas that are mechanically plowed or tilled because they can form above plow pans in non-wetland soils that have been compacted by tillage or where a pan has developed due to plow shear. Plow pans form just below the maximum tillage depth (generally 6 to 8 in. (15 to 20 cm)), and can be identified by their higher bulk density; massive, cloddy structure; and roots growing horizontally on top of the compacted zone.

C3: Oxidized Rhizospheres Along Living Roots

Figure 40. This soil has many oxidized rhizospheres associated with living roots.

Figure 41. Iron-oxide plaque (orange coating) on a living root. Iron also coats the channel or pore from which the root was removed.

C4: Presence of Reduced Iron

General Description: Presence of a layer containing reduced (ferrous) iron in the upper 12 in. (30 cm) of the soil profile, as indicated by a ferrous iron test or by the presence of a soil that changes color upon exposure to the air.

Cautions and User Notes: The reduction of iron occurs in soils that have been saturated long enough to become anaerobic and chemically reduced. Ferrous iron is converted to oxidized forms when saturation ends and the soil reverts to an aerobic state. Thus, the presence of ferrous iron indicates that the soil is saturated and anaerobic at the time of sampling, and has been saturated for an extended period. The presence of ferrous iron can be **verified with alpha, alpha-dipyridyl dye** or by observing a soil that changes color upon exposure to air (i.e., reduced matrix). A positive reaction to alpha, alpha-dipyridyl dye should occur over more than 50 percent of the soil layer in question. The dye does not react when wetlands are dry; therefore, a negative test result is not evidence that the soil is not reduced at other times of year. Soil samples should be tested or examined immediately after opening the soil pit because ferrous iron may oxidize and colors change soon after the sample is exposed to the air. Avoid areas of the soil that may have been in contact with iron digging tools. Soils that contain little weatherable iron may not react even when saturated and reduced. There are no minimum thickness requirements or initial color requirements for the soil layer in question.

NEW Primary– GP & MW

Figure 41. When alpha, alpha-dipyridyl dye is applied to a soil containing reduced iron, a positive reaction is indicated by a pink or red coloration to the treated area.

C6: Recent Iron Reduction in Tilled Soils

General Description: Presence of a layer containing 2 percent or more redox concentrations as pore linings or soft masses in the tilled surface layer of soils cultivated within the last two years. The layer containing redox concentrations must be within the tilled zone or within 12 in. (30 cm) of the soil surface, whichever is shallower.

Cautions and User Notes: Cultivation breaks up or destroys redox features in the plow zone. The presence of redox features that are continuous and unbroken indicates that the soil was saturated and reduced since the last episode of cultivation (Figure 42). Redox features often form around organic material, such as crop residue, incorporated into the tilled soil. Use caution with older features that may be broken up but not destroyed by tillage. The indicator is most reliable in areas that are cultivated regularly, so that soil aggregates and older redox features are more likely to be broken up. If not obvious, information about the timing of last cultivation may be available from the land owner. A plow zone 6 to 8 in. (15 to 20 cm) deep is typical but may extend deeper. There is no minimum thickness requirement for the layer containing redox concentrations.

Figure 42. Redox concentrations in the tilled surface layer of a recently cultivated soil.

NEW

Primary– MW

C7: Thin Muck Surface

NEW Primary– GP & MW

General Description: This indicator consists of a layer of muck 1 in. (2.5 cm) or less thick on the soil surface.

Cautions and User Notes: Muck is highly decomposed organic material (see the Concepts section of Chapter 3 for guidance on identifying muck). In a dry climate, muck accumulates only where soils are saturated to the surface for long periods each year. Thick muck layers can persist for years after wetland hydrology is effectively removed; therefore, a muck layer greater than 1 in. thick does not qualify for this indicator. However, thin muck surfaces disappear quickly or become incorporated into mineral horizons when wetland hydrology is withdrawn. Therefore, the presence of a thin muck layer on the soil surface indicates an active wetland hydrologic regime.

C8: Crayfish Burrows

General Description: Presence of crayfish burrows, as indicated by openings in soft ground up to 2 in. (5 cm) in diameter, often surrounded by chimney-like mounds of excavated mud.

Cautions and User Notes: Crayfish breathe with gills and require at least periodic contact with water. Some species dig burrows for refuge and breeding (Figure 42). Crayfish burrows are usually found near streams, ditches, and ponds in areas that are seasonally inundated or have seasonal high water tables at or near the surface. They are also found in wet meadows and pastures where there is no open water. Crayfish may extend their burrows 10 ft (3 m) or more in depth to keep pace with a falling water table.

NEW Secondary – GP & MW

Figure 42. Crayfish burrow in a saturated wetland.

C9: Saturation Visible on Aerial Imagery

NEW Secondary – GP & MW

General Description: One or **MORE** recent aerial photographs or satellite images indicate soil saturation. Saturated soil signatures must correspond to field-verified hydric soils, depressions or drainage patterns, differential crop management, or other evidence of a seasonal high water table.

Cautions and User Notes: This indicator is useful when plant cover is sparse or absent and the ground surface is visible from above. Saturated areas generally appear as darker patches within the field (Figure 43). Inundated (indicator B7) and saturated areas may be present in the same field; if they cannot be distinguished, then use indicator C9 for the entire wet area. Care must be used in applying this indicator because saturation may be present on a non-wetland site immediately after a heavy rain or during periods of abnormally high precipitation, runoff, tides, or river stages. Saturation observed during the non-growing season may be an acceptable indicator if experience and professional judgment suggest that wet conditions normally extend into the growing season for sufficient duration in most years. Saturation may be absent from a wetland during the normal dry season or during extended periods of drought. Even under normal rainfall conditions, some wetlands do not become inundated or saturated every year. If available, it is recommended that multiple years of photography be evaluated. If 5 or more years of aerial photography are available, the procedure described by the Natural Resources Conservation Service (1997, section 650.1903) is recommended. Use caution, as similar signatures may be caused by factors other than saturation. This indicator requires on-site verification that saturation signatures seen on photos correspond to hydric soils or other evidence of a seasonal high water table. This may be a useful tool for identifying the presence and location of subsurface drainage lines in current or former agricultural fields, and multiple years of photos may be helpful in evaluating the frequency and extent of soil saturation. This method may be inconclusive in areas with dark soil surfaces.

NOTE: This IS THE SAME as the SDMC Hydrology Step 3 because of Chapter 5 Hydrology Procedure 3f (FSA slide review).

Group D – Evidence from other site conditions or data - secondary

- D1 – Stunted or stressed plants
- D2 – Geomorphic position
- D5 – FAC Neutral test
- D7 – Frost-heave hummocks
- D9 – Gauge or well data

D1: Stunted or Stressed Plants

General Description: In agricultural or planted vegetation located in a depression, swale, or other topographically low area, this indicator is present if individuals of the same species growing in the potential wetland are clearly of smaller stature, less vigorous, or stressed compared with individuals growing in nearby drier landscape situations.

Cautions and User Notes: Usually this indicator is associated with depressions or swales in crop or hay fields. Agricultural crops and other introduced or planted species, such as corn (*Zea mays*), wheat (*Triticum* spp.), and alfalfa (*Medicago* spp.), can become established in wetlands but often exhibit obvious stunting, yellowing, or stress in wet situations (Figure 45). Use caution in areas where stunting of plants on non-wetland sites may be caused by low soil fertility, excessively drained soils, salinity, cold temperatures, uneven application of agricultural chemicals, or other factors not related to wetness. For this indicator to be present, a majority of individuals in the potential wetland area must be stunted or stressed. In the Midwest region, this indicator is restricted to agricultural or planted vegetation.

NEW Secondary – MW

Figure 45. Stunted and yellowed corn due to wet spots in an agricultural field.

D2: Geomorphic Position

NEW Secondary– GP & MW

General Description: This indicator is present if the area in question is located in a localized depression, linear drainageway, concave position within a floodplain, at the toe of a slope, on the low-elevation fringe of a pond or other water body, or in an area where groundwater discharges.

Cautions and User Notes: Excess water from precipitation and snowmelt naturally accumulates in certain geomorphic positions in the landscape, particularly in low-lying areas such as depressions, drainageways, toe slopes, and fringes of water bodies. These areas often, but not always, exhibit wetland hydrology. This indicator does not include concave positions on rapidly permeable soils (e.g., floodplains with sand and gravel substrates) that do not have wetland hydrology unless the water table is near the surface.

DO NOT USE this indicator in areas with functioning drainage systems (ALTERED TO THE BOTTOM in depressions and any drainage in linear systems).

NO CHANGE
Secondary – GP & MW

Indicator D5: FAC-neutral test

Category: Secondary

General Description: The plant community passes the FAC-neutral test.

Cautions and User Notes: The FAC-neutral test is performed by compiling a list of dominant plant species across all strata in the community, and dropping from the list any species with a Facultative indicator status (i.e., FAC, FAC–, and FAC+). The FAC-neutral test is met if more than 50 percent of the remaining dominant species are rated FACW and/or OBL. This indicator can be used in communities that contain no FAC dominants. If there are an equal number of dominants that are OBL and FACW versus FACU and UPL, non-dominant species should be considered.

This indicator is only applicable to wetland hydrology determinations.

FAC-neutral test may be used on altered sites using on-site vegetation.

D7: Frost-heave Hummocks

NEW Secondary– GP

General Description: This indicator consists of hummocky microtopography produced by frost action in saturated wetland soils.

Applicable Subregion: Applicable to the Northern Great Plains Subregion (LRR F).

Cautions and User Notes: In the Northern Great Plains, freeze/thaw action creates hummocky micro-topography in saturated soils in and along the edges of wetlands (Figure 44). This indicator is not known to occur outside of LRR F. This indicator does not include pimple mounds, gilgai microrelief in clay soils (e.g., Vertisols), or other factors (e.g., trampling by livestock) that can produce hummocky topography.

Figure 44. Frost-heave hummocks.

D9: Gauge or Well Data

NEW
Primary– MW

General Description: Stream or lake gauge data, or groundwater well data, indicate that the site is inundated or has a water table 12 in. (30 cm) or less below the surface for 14 or more consecutive days during the growing season in most years (at least 5 years in 10, or 50 percent or higher probability), or meets an alternative wetland hydrology standard established for a particular geographic area or wetland type.

Cautions and User Notes: This indicator may be used in any area that is subject to flooding, ponding, or shallow water tables, and is not limited to highly disturbed or problematic wetland situations (U. S. Army Corps of Engineers 2005). Any combination of inundation or soil saturation is sufficient to meet the 14-day requirement. An evaluation of the normality of water levels or precipitation during the monitoring period is required if fewer than 10 years of recent gauge or well data are available. See Chapter 5 or U. S. Army Corps of Engineers (2005) for guidance. This hydrology standard is based on recommendations by the National Research Council (1995). Alternative standards for specific geographic areas or wetland types are also acceptable, if supported by appropriate scientific literature, field studies, or professional opinion. Alternative wetland hydrology standards are subject to approval by the appropriate Corps District. Sources of gauge or well data include the U. S. Geological Survey, Corps of Engineers, other federal and state agencies, cities, counties, and land developers.

Growing Season

Beginning and ending dates of the growing season may be needed to evaluate certain wetland indicators, such as visual observations of flooding, ponding, or shallow water tables on potential wetland sites.

Growing Season. In the absence of site-specific information, growing season dates may be estimated by using WETS tables to determine the median dates of 28 °F (-2.2 °C) air temperatures in spring and fall based on long-term records gathered at the nearest appropriate National Weather Service meteorological station. However, if practical, growing season in a given year should be determined through on-site observation of biological activity, including (1) growth and activity in vascular plants and (2) soil temperature (see Chapter 4).

The end of the growing season is indicated when woody deciduous species lose their leaves and/or the last herbaceous plants cease flowering and their leaves become dry or brown, generally in the fall due to cold temperatures or reduced moisture availability. Early plant senescence due to the initiation of the summer dry season in some areas does not necessarily indicate the end of the growing season and alternative procedures (e.g., WETS tables) should be used.

How to Determine the Start of the Growing Season?

- In the absence of site-specific information, use the 28-degree F., 5 years in 10 per WETS tables (no change)
- Observation of the "Green-Up" Criteria (new)
- Measurement of soil temperature at 12 inches is 41 degrees F. or higher (modified)

"Green-Up" Criteria for Start of the Growing Season

1. The growing season has begun on a site in a given year when two or more different non-evergreen vascular plant species growing in the wetland or surrounding areas exhibit one or more of the following indicators of biological activity:

    a. Emergence of herbaceous plants from the ground (protective sheath enclosing shoot tip/embryonic leaves)
    b. Appearance of new growth from vegetative crowns (e.g., in graminoids, bulbs, and corms)
    c. Coleoptile/cotyledon emergence from seed
    d. Bud burst on woody plants (i.e., some green foliage is visible between spreading scales)
    e. Emergence or elongation of leaves of woody plants
    f. Emergence or opening of flowers

Example of Potential Differences in the Start of the Growing Season

- **From WETS table:**
  - **April 29 was 28 degree F., 5 years in 10 date.**
- **From the field:**
  - **Reed canary grass shoots were 4-6 inches in height.**
  - **Sedge (*Carex*) leaves were 4-6 inches in height.**
  - **"Green up" indicator was 1, 2 or 3 weeks earlier than 28 degree F., 5 in 10.**

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ATTACHMENT C

WETLAND SIGNATURE EXAMPLES

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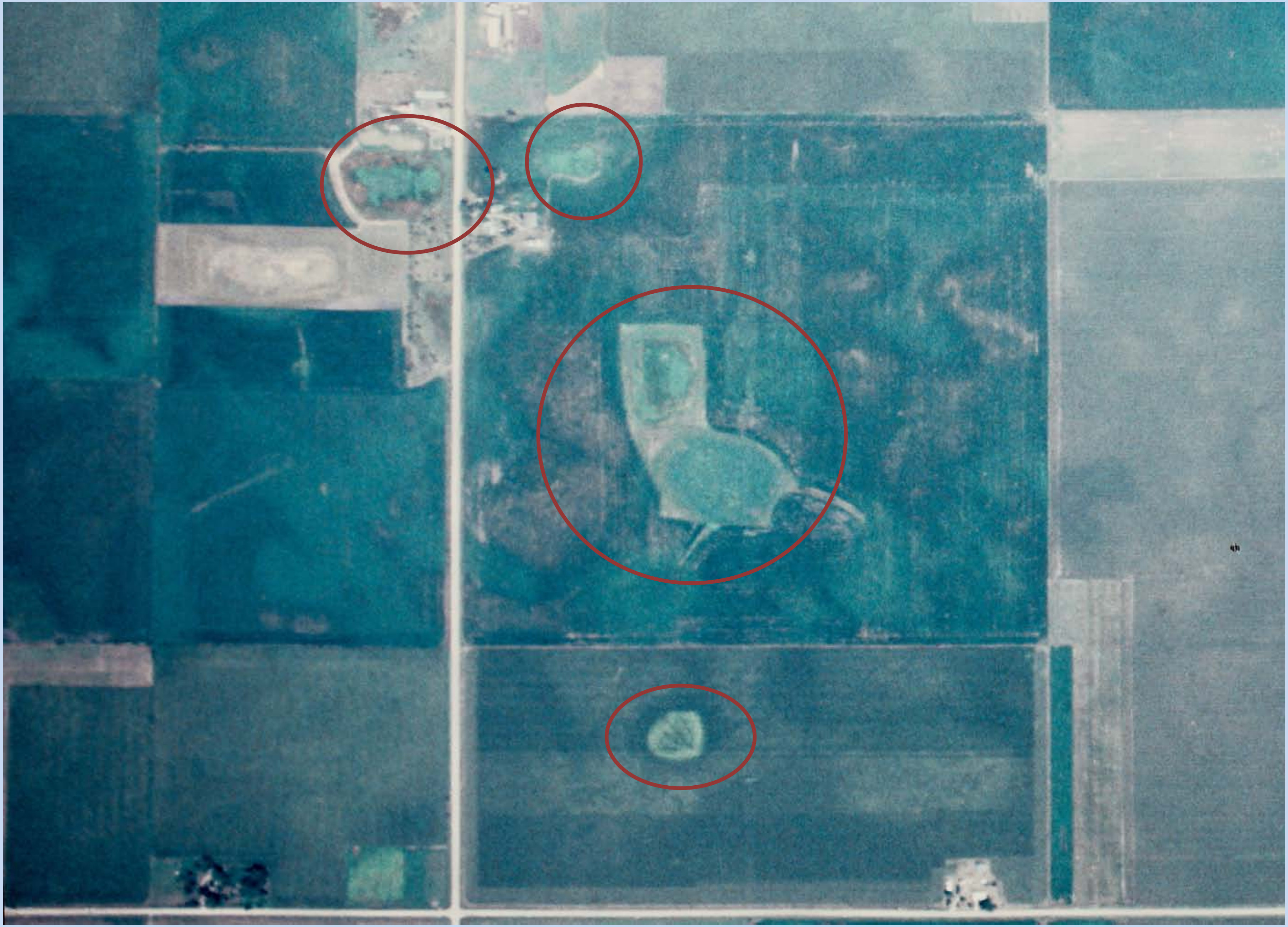
Multiple types of wetness signatures including color tones



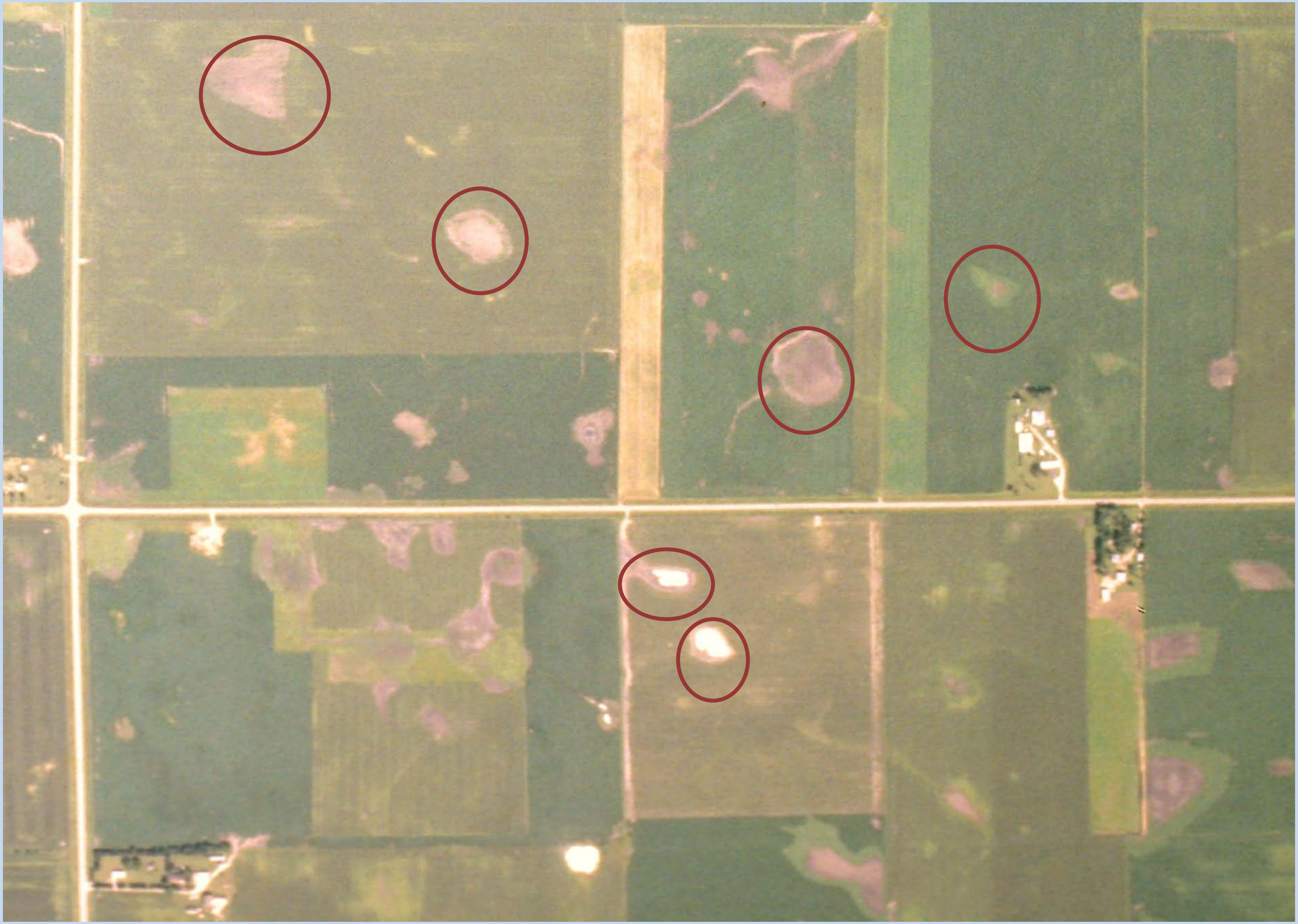
Multiple types of wetness signatures including color tones

Inundation and Color Tones (potholes, oxbows, other depressional areas)

Multiple types of wetness signatures including color tones

Multiple types of wetness signatures including color tones

Multiple types of wetness signatures including color tones



Multiple types of wetness signatures including color tones

Multiple types of wetness signatures including color tones

Multiple types of wetness signatures including color tones

Multiple types of wetness signatures including color tones

Multiple types of wetness signatures including color tones

Multiple types of wetness signatures including color tones

ATTACHMENT D

OTHER WATERS (NI) EXAMPLES

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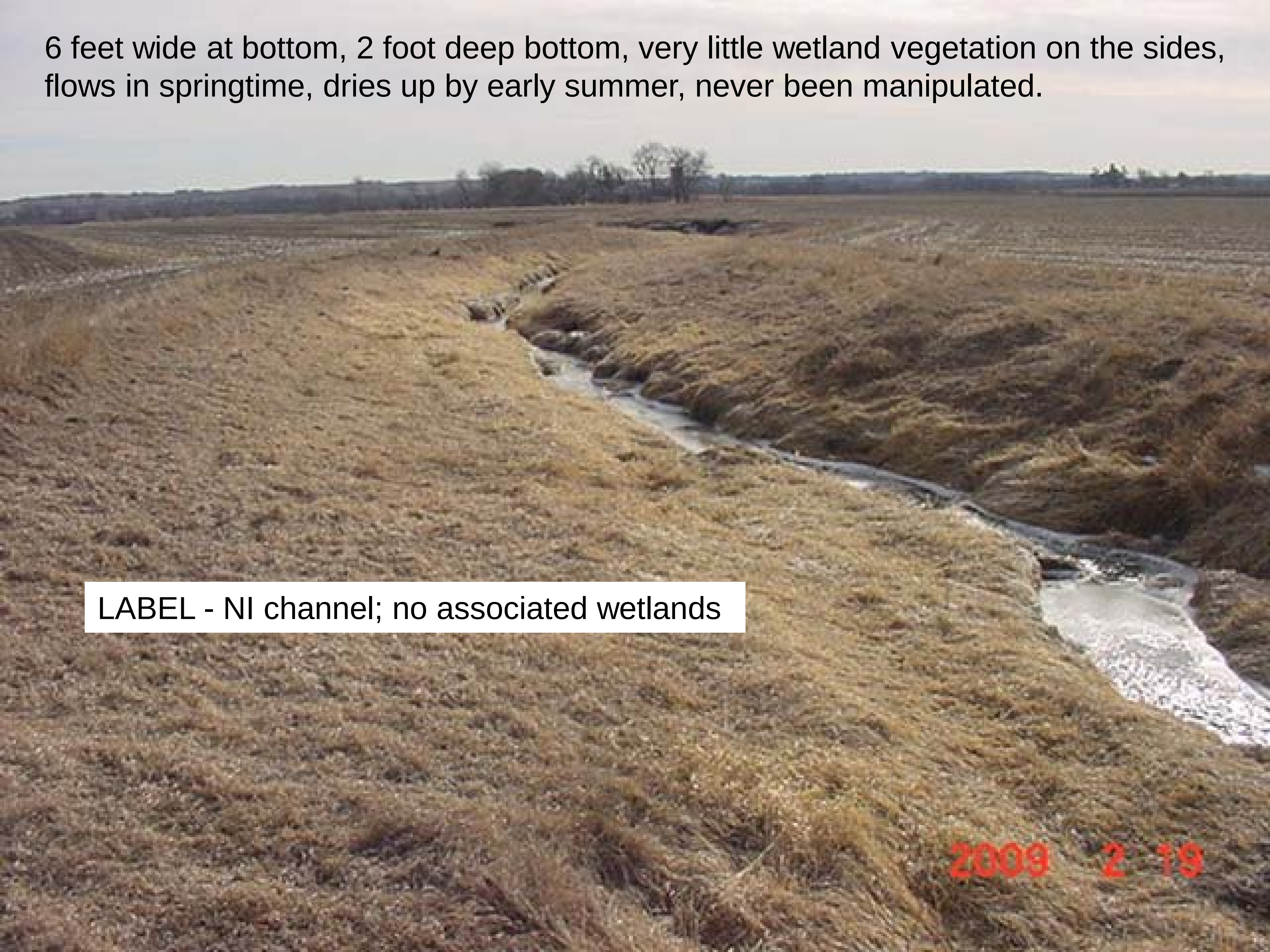
- **ALL OF THESE SLIDES ARE BLUE LINE STREAMS AND ALL ARE NON-POTHOLE**

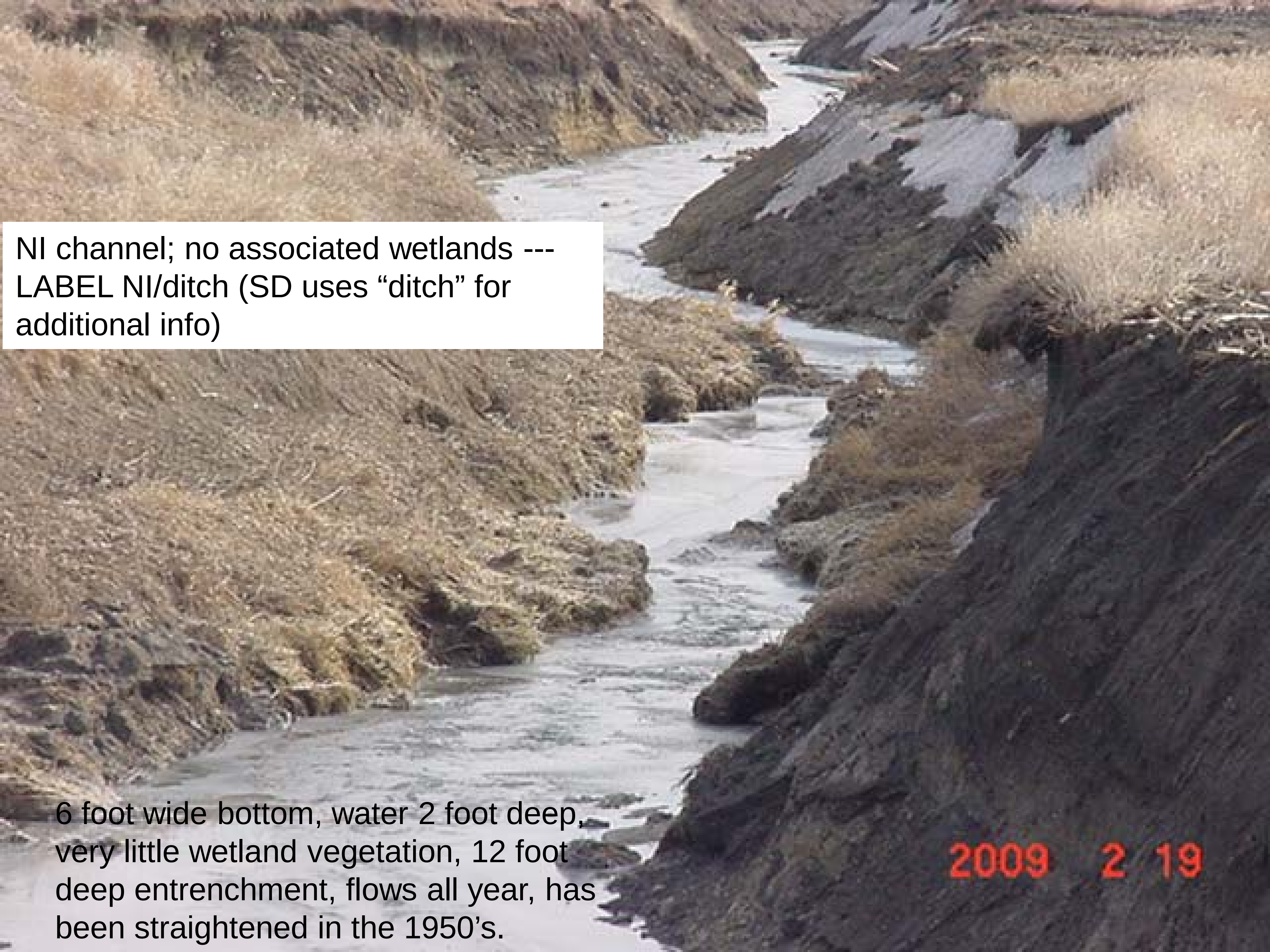
- **ALL OF THESE SLIDES ARE REQUESTS BECAUSE THE PRODUCER IS GOING TO TILE OR OTHERWISE MANIPULATE THE AREA**

6 feet wide at bottom, 2 foot deep bottom, very little wetland vegetation on the sides, flows in springtime, dries up by early summer, never been manipulated.



LABEL - NI channel; no associated wetlands

NI channel; no associated wetlands ---
LABEL NI/ditch (SD uses “ditch” for additional info)



6 foot wide bottom, water 2 foot deep, very little wetland vegetation, 12 foot deep entrenchment, flows all year, has been straightened in the 1950’s.


LABEL - NI channel; W polygon associated wetlands
3 foot wide stream, never been manipulated, wetland vegetation surrounding the stream, vegetation ranges from 60 to about 150 feet in width, dries up in early summer, floodplain soils, F6 indicator.
2009 2 19

Linear soil, plow ditch evident on 1964 photo, wetland vegetation in the swale, ranges from 30 to 60 feet wide, F6 soil indicator

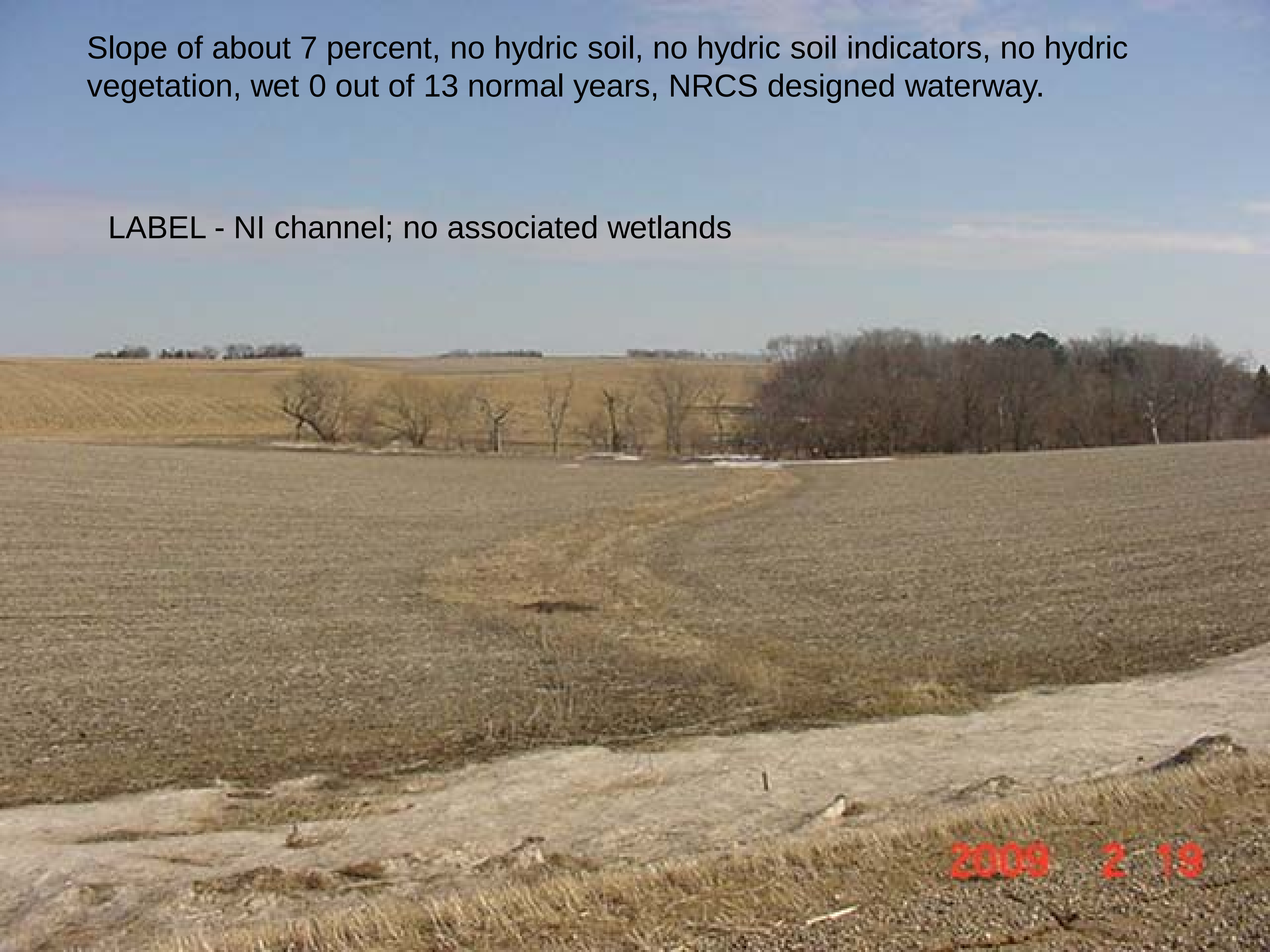
LABEL - NI channel; no associated wetlands

No hydric soil, no hydric vegetation, no ditch, wet 0 out of 13 normal years.

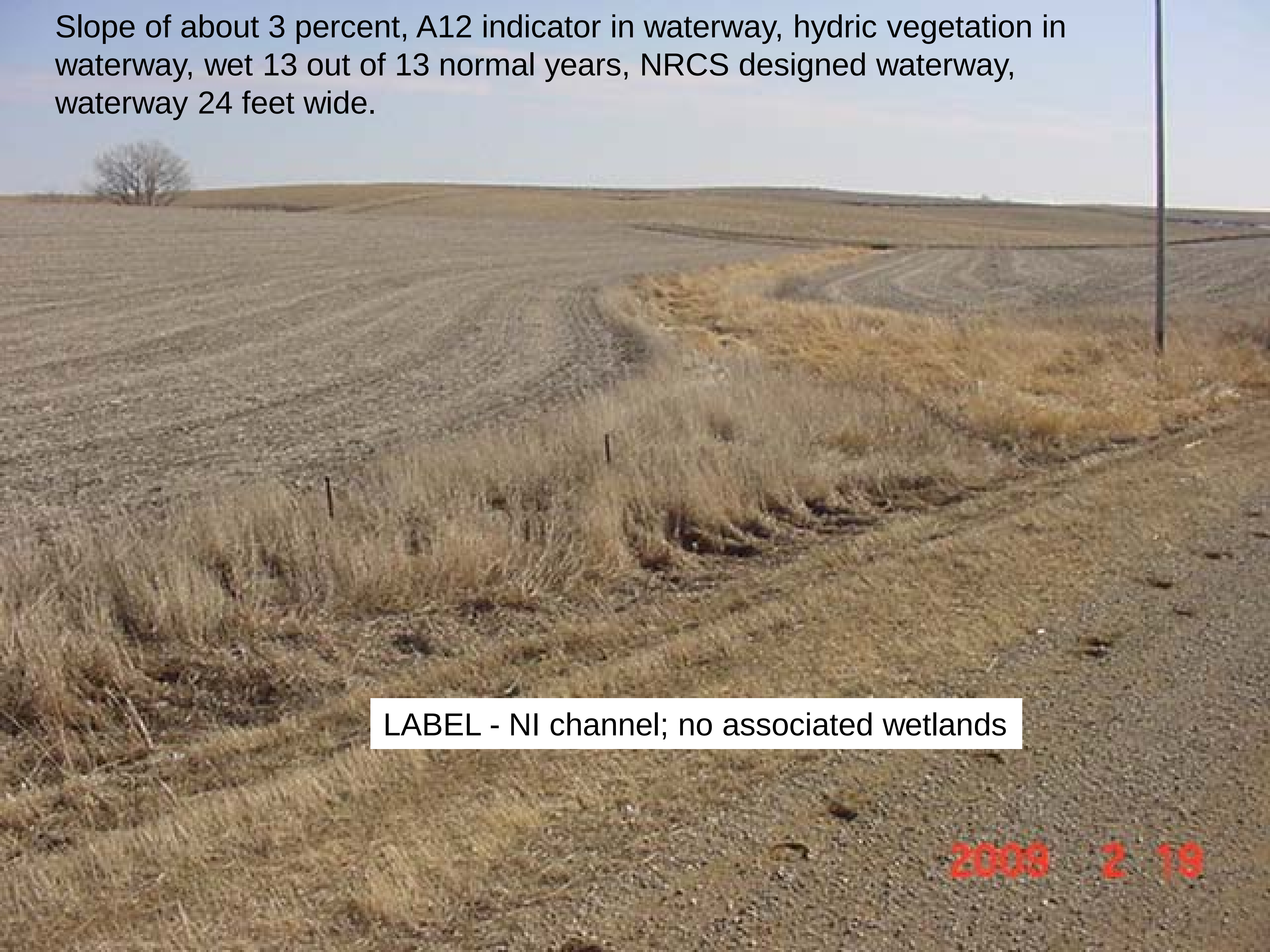
LABEL - NI channel; no associated wetlands

Scraper ditch 1.5 feet deep 8 foot bottom, 24 foot top, wet 13 out of 13 normal years, adjacent soil has wetland vegetation, F6 indicator, adjacent soil is 300 to 600 feet wide.

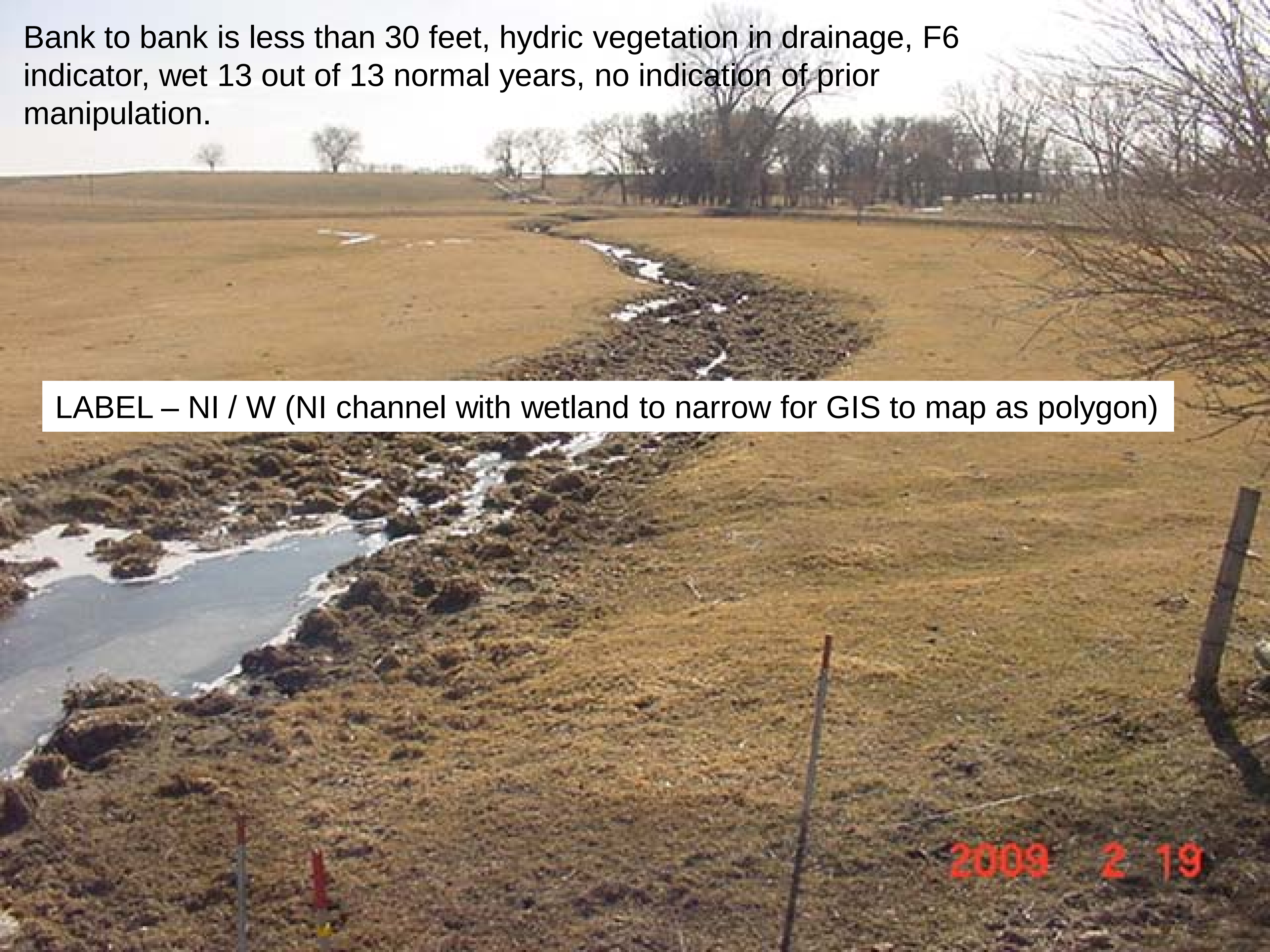
LABEL - NI channel; PC associated wetland polygon


Slope of about 7 percent, no hydric soil, no hydric soil indicators, no hydric vegetation, wet 0 out of 13 normal years, NRCS designed waterway.
LABEL - NI channel; no associated wetlands
2009 2 19

Slope of about 3 percent, A12 indicator in waterway, hydric vegetation in waterway, wet 13 out of 13 normal years, NRCS designed waterway, waterway 24 feet wide.



Bank to bank is less than 30 feet, hydric vegetation in drainage, F6 indicator, wet 13 out of 13 normal years, no indication of prior manipulation.



LABEL – NI / W (NI channel with wetland to narrow for GIS to map as polygon)

Ditch evident in 1984 photo, A12 indicator, wet 3 out of 13 normal years, no hydric vegetation.

LABEL – NI; no associated wetlands

LABEL NI channel; no associated wetlands – PC if hydric soils