

# Field and Office Delineations

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# Field vs. Office Delineations

- Field Delineations
  - ▶ Raw Data
  - ▶ Current conditions
    - Is the site disturbed?
    - Are any indicators problematic?
  - ▶ Wetlands not identified in office delineations may be discovered



# Field vs. Office Delineations Cont.

- Office Delineations (Off-Site)
  - ▶ Quick
  - ▶ Available office data can be used to provide:
    - Historical data
    - Supporting data for on-site delineations
    - Information on the type of water resource
    - An approximate boundary
  - ▶ Not as accurate as on-site delineations



# Off-Site Procedures

Off-Site procedures are described in:

- Corps of Engineers Wetlands Delineation Manual (Part IV, Section D, Subsection 1)
- National Food Security Act Manual (Parts 513 and 514) in combination with state wetland mapping conventions



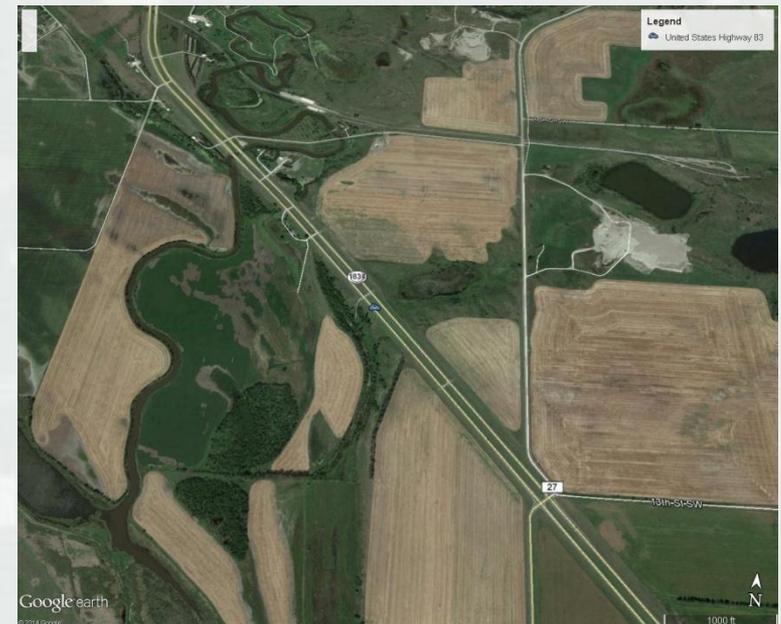
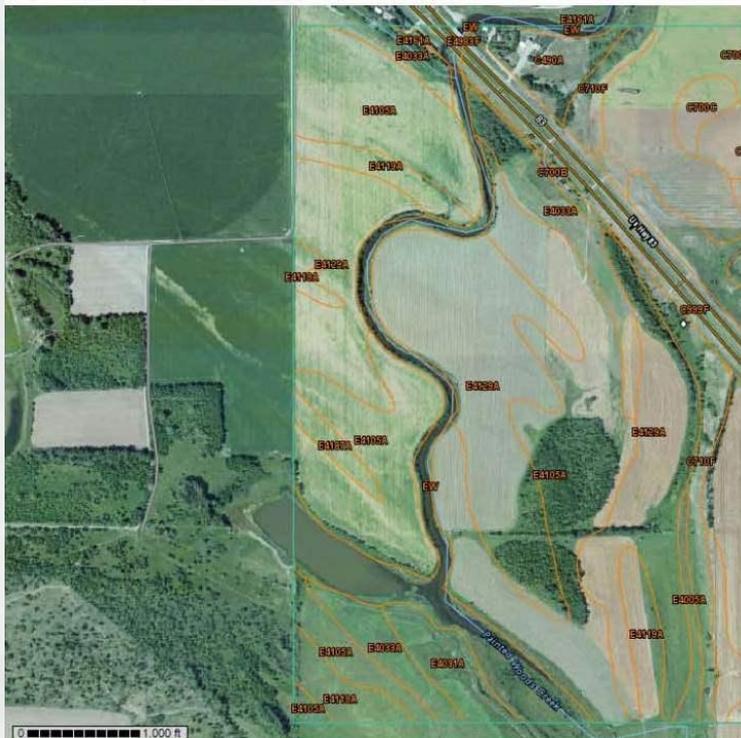
# Off-Site Procedures

- More data makes for a strong determination.
- Data to include:
  - ▶ Aerial imagery
  - ▶ Historical hydrology trends
  - ▶ NWI maps
  - ▶ Soil surveys
- Benefits of providing more supportive data and concise delineations:
  - ▶ Parameters of current and past trends are understood
  - ▶ Earlier turn around by the Corps of Engineers



# Preliminary Data Gathering

- Off-site sources of information are used to plan and carry out an on-site delineation.



# Coordinate Conversion

- <http://transition.fcc.gov/mb/audio/bickel/DD DMMSS-decimal.html>

**Degrees Minutes Seconds to Decimal Degrees**

Enter Degrees Minutes Seconds latitude:

Enter Degrees Minutes Seconds longitude:

**Results:** Latitude:  Longitude:

**Decimal Degrees to Degrees Minutes Seconds**

Enter Decimal Latitude:

Enter Decimal Longitude:

**Results:** Latitude:  Longitude:



# Topographic Maps

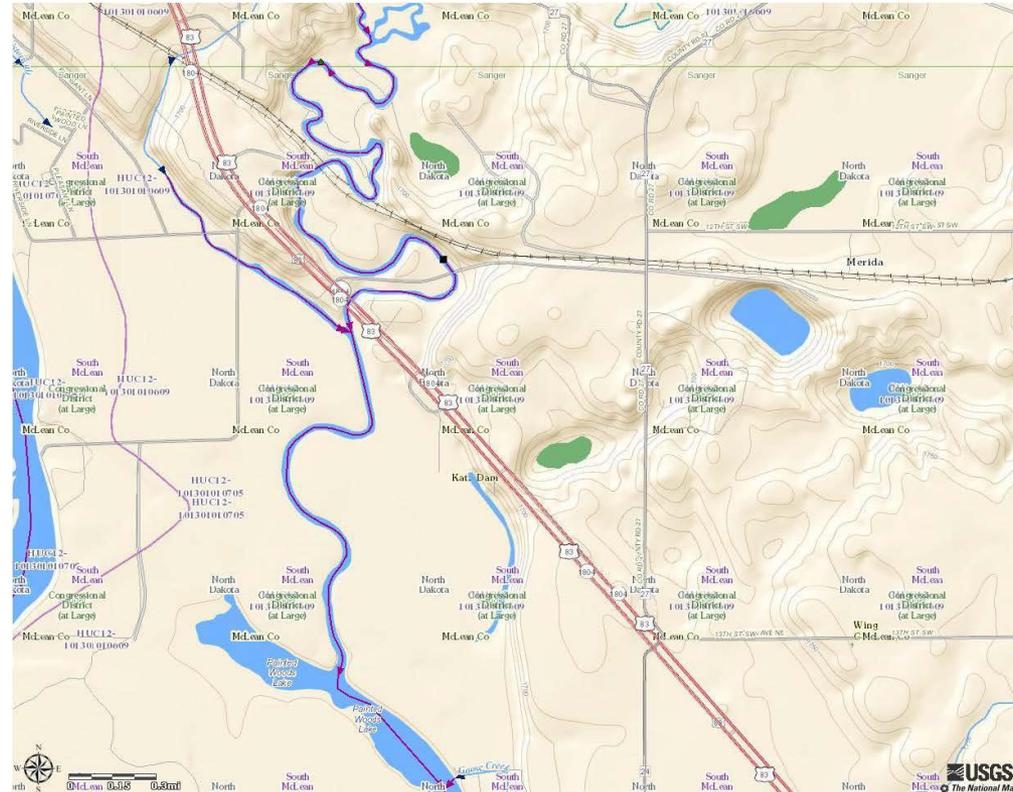
- USGS national map viewer
    - ▶ Transportation data
      - Roads, highways, interstates, and railroads
    - ▶ Hydrology data
    - ▶ Topographic contours
    - ▶ Government boundaries
      - County line
      - State lines,
      - Section, Township, Range
      - HUC information
- All on one Map!!!



# USGS Topographic Maps

## The National Map

NOTES: Data available from U.S. Geological Survey, National Geospatial Program.



[Open in The National Map Viewer](#)

4/18/14 1:47 PM



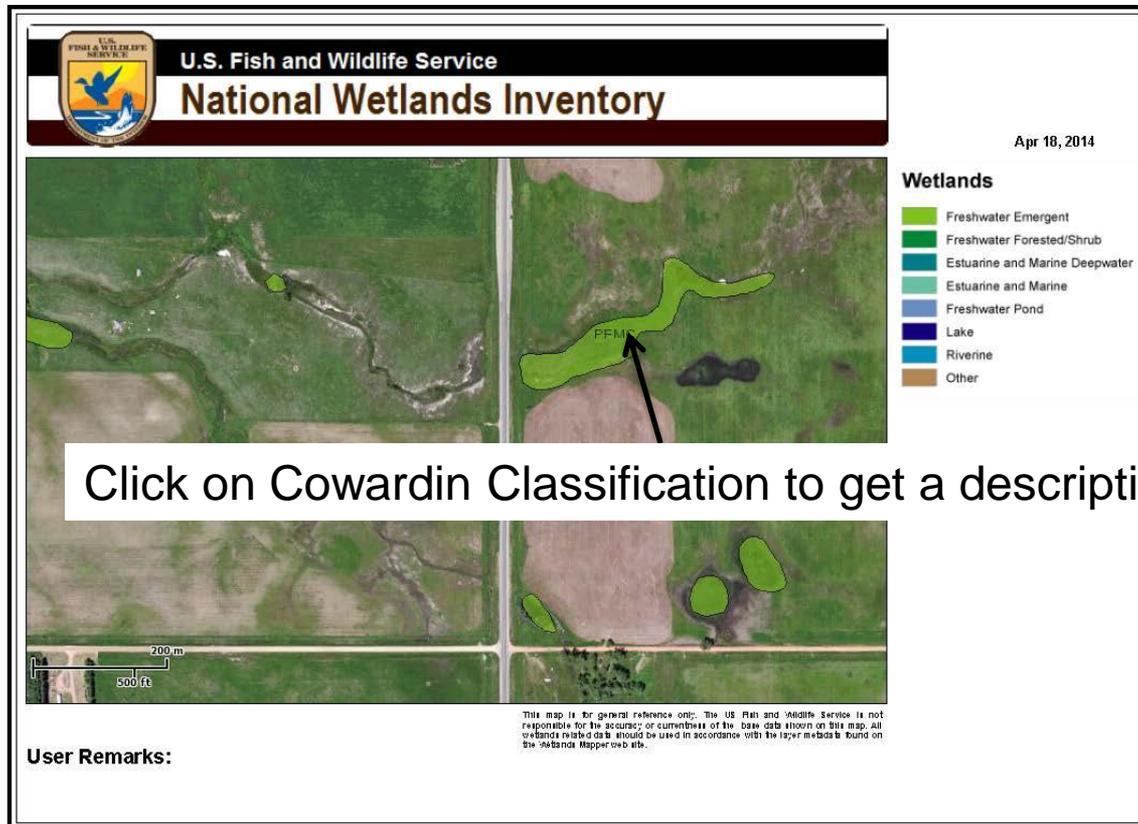
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# National Wetland Inventory Maps (NWI)

- Provides information regarding:
  - ▶ Wetland types
  - ▶ Hydrology
  - ▶ Approximate boundaries
  
- Problems with NWI?
  - ▶ The data is not updated, which can lead to:
    - Misinterpretation of wetland types and boundaries
    - Missed wetlands in the review area



# NWI Wetlands Mapper



# NRCS Web Soil Survey

- Contains the latest soils data
  - ▶ Supersedes hardcopy surveys
- Data include:
  - ▶ Soil series
  - ▶ Hydric soil status
  - ▶ Water features
  - ▶ Depth to restrictive layer
  - ▶ Drainage class
- Web survey does go down... so don't wait until the last minute.



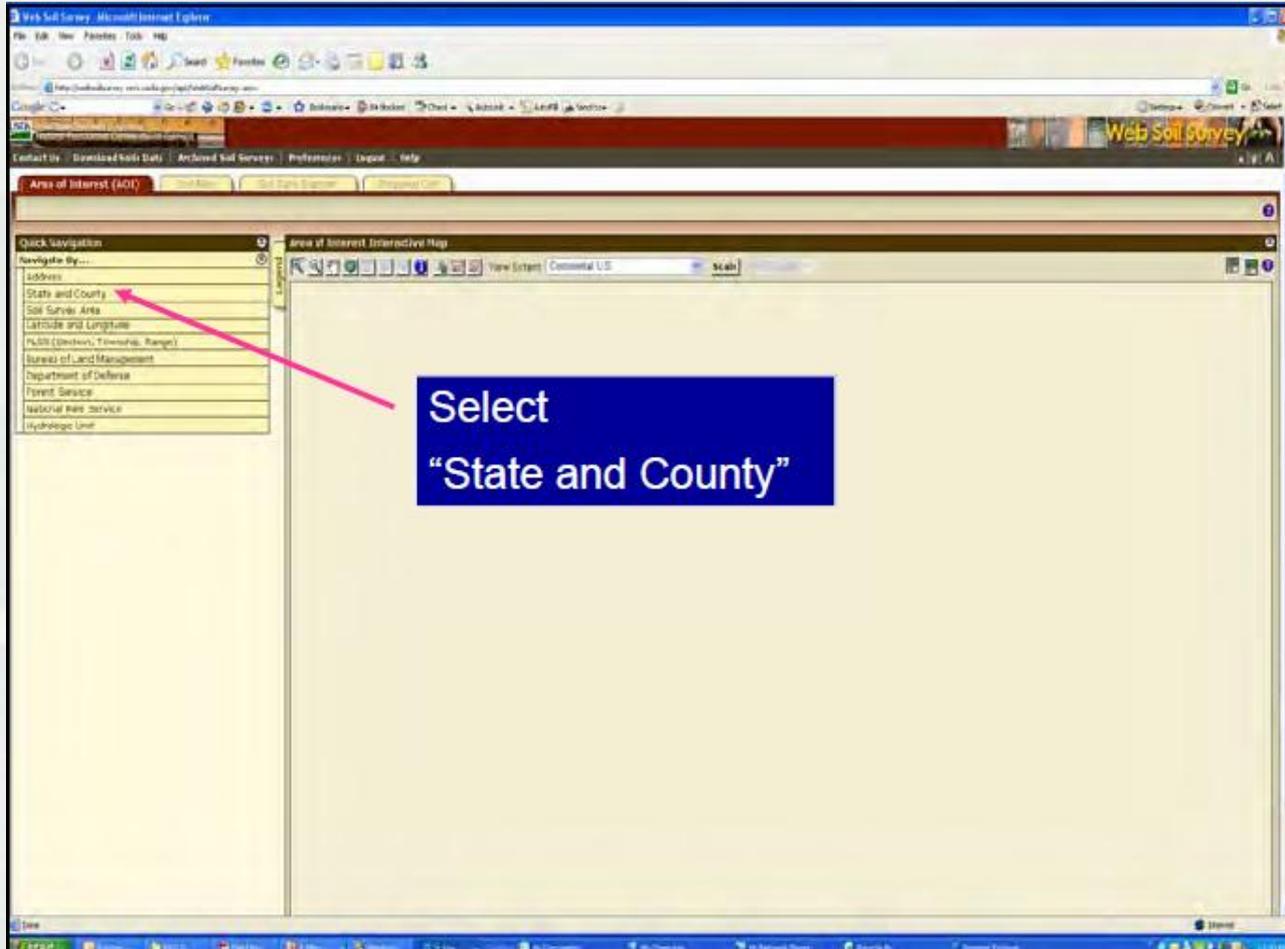
# Off-Site Methods

The screenshot shows the Web Soil Survey (WSS) website. The browser window title is "Web Soil Survey - Home - Microsoft Internet Explorer". The address bar shows the URL "http://websoilsurvey.nrcs.usda.gov/app/". The page content includes a navigation menu on the left, a main content area with a "Welcome to Web Soil Survey (WSS)" section, and a right sidebar with various links and information. A pink arrow points to a green "START WSS" button. The URL "http://websoilsurvey.nrcs.usda.gov/app/" is displayed in a blue box at the bottom left of the screenshot.

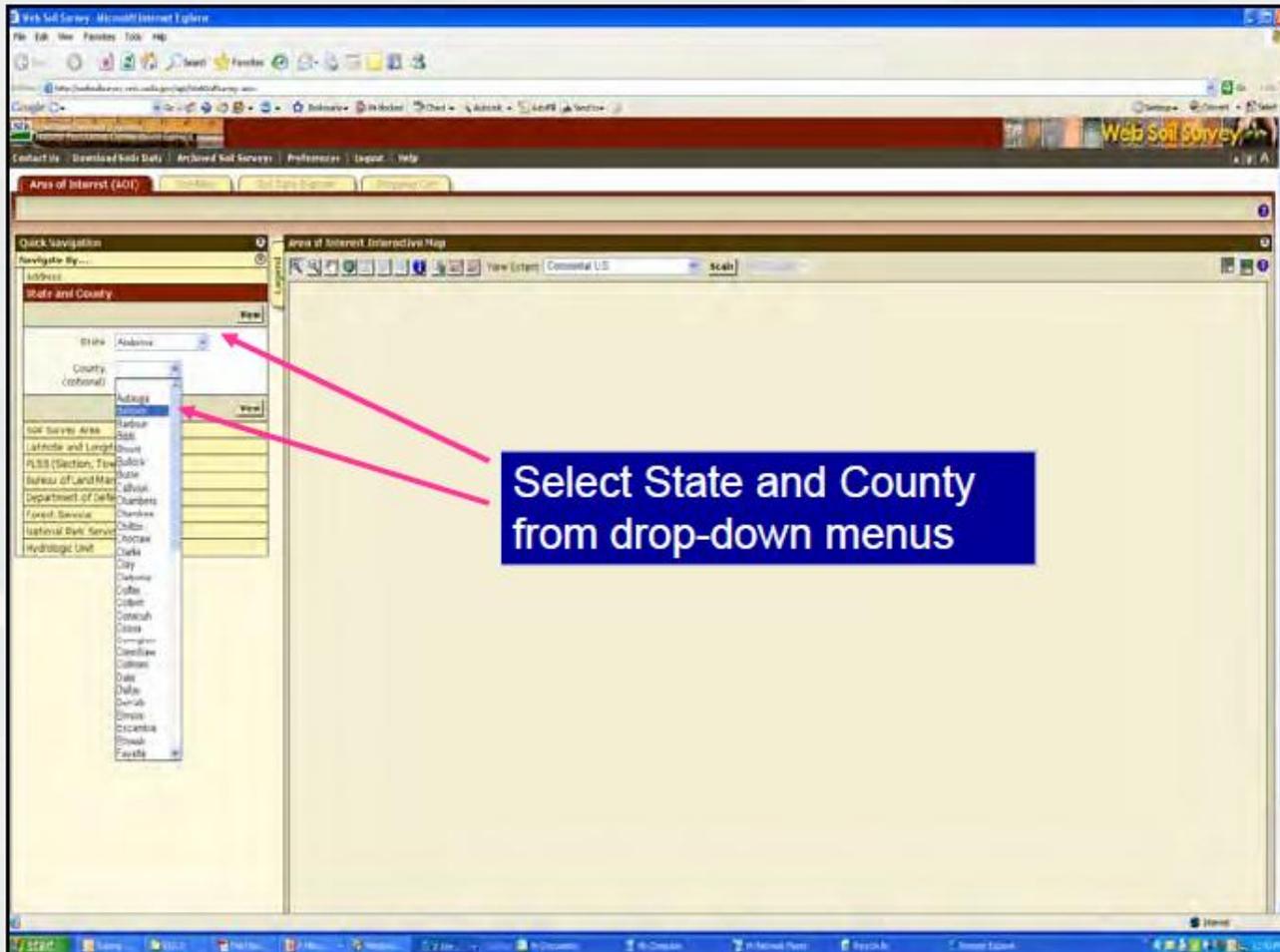


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# Off-Site Methods



# Off-Site Methods



# Off-Site Methods

The screenshot displays the Web Soil Survey application in a Microsoft Internet Explorer browser window. The interface includes a search bar, a navigation panel on the left, and a central map of Alabama. A blue box with white text is overlaid on the bottom left of the map area, listing navigation tools. A pink arrow points from the 'Navigation tools:' text to the map's navigation controls.

Navigation tools:  
Zoom  
Scroll  
Set AOI (Area Of Interest)



# Off-Site Methods

The screenshot displays the Web Soil Survey web application. The interface includes a navigation pane on the left with fields for 'State and County' (Alabama, Baldwin) and a list of associated agencies. The main area features an interactive map of Alabama with a red box highlighting a specific region. A pink arrow points from the text 'Zoom into the area by selecting a box around it' to this red box. Another pink arrow points from the text 'Zoom tool is selected' to the zoom tool icon in the map's toolbar.

Zoom tool is selected

Zoom into the area by selecting a box around it



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# Off-Site Methods

**Search**

**Area of Interest**

Import AOI

**Quick Navigation**

Address

State and County

Soil Survey Area

**Latitude and Longitude**

?

Latitude, Longitude:

Show location marker

PLSS (Section, Township, Range)

Bureau of Land Management

Department of Defense

Forest Service

National Park Service

Hydrologic Unit

**Area of Interest Interac**

Legend

0 656mi

**Enter Coordinates**



# Off-Site Methods

The screenshot shows the 'Web Soil Survey' application in a Microsoft Internet Explorer browser. The interface includes a navigation pane on the left with a 'Quick Navigation' section containing a 'State and County' dropdown menu. The main area displays a satellite-style map of a coastal region. A red rectangular box is drawn on the map to indicate a selected Area of Interest (AOI). A red arrow points from the 'AOI tool is selected' text box to the 'AOI' button in the top navigation bar. Another red arrow points from the 'Select AOI by placing a box around it' text box to the red box on the map.

AOI tool is selected

Select AOI by placing a box around it



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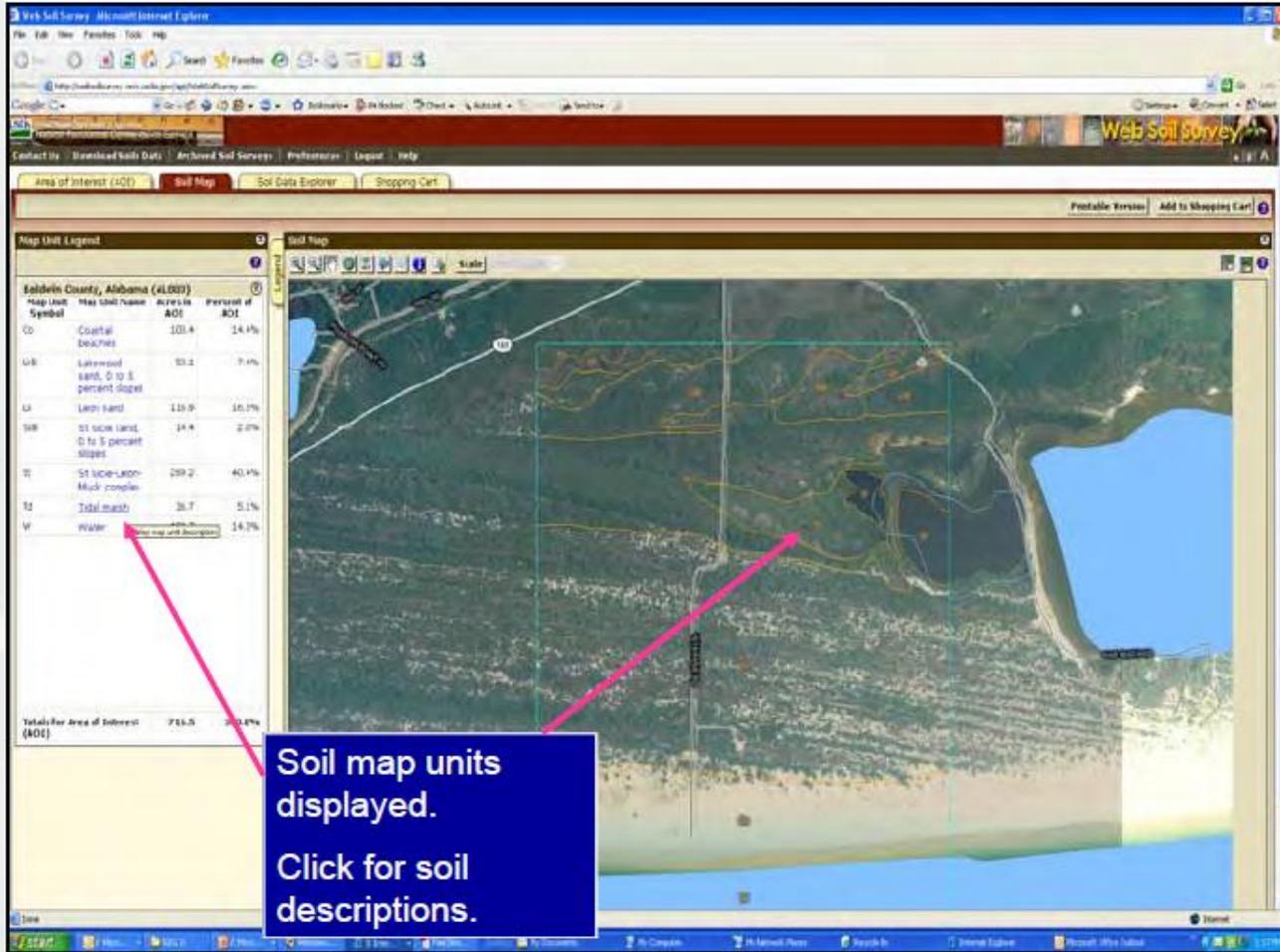
# Off-Site Methods

Select "Soil Map"

AOI is set.  
Acreage is provided.  
Soil map and data provided.



# Off-Site Methods



# Off-Site Methods

The screenshot displays the Web Soil Survey interface. On the left, a legend table lists soil types and their percentages. The 'T2 Tidal marsh' soil type is highlighted with a pink box. The main window shows a map of Baldwin County, Alabama, with a pink box highlighting the 'T2 - Tidal marsh' soil type. To the right of the map, detailed information for the T2 soil is provided, including its description, setting, properties, and typical profile.

Map Unit	Soil Name	Area in Acres	Percent of AOT
01	Coastal beach	100.4	14.0%
10A	Laminated sand, 0 to 8 percent slope	52.1	7.4%
11	Laminated sand, 8 to 15 percent slope	118.9	16.7%
16B	0 to 5 percent slope	10.4	1.5%
16	5 to 15 percent slope	209.2	29.4%
<b>T2</b>	<b>Tidal marsh</b>	<b>26.7</b>	<b>3.7%</b>
0	Water	110.7	15.3%

**Map Unit Description**  
Baldwin County, Alabama Version date: 7/18/2006 7:09:50 AM  
**T2 - Tidal marsh**

**Map Unit Setting**  
Elevation: 0 to 10 feet  
Mean annual precipitation: 48 to 67 inches  
Mean annual air temperature: 62 to 77 degrees F  
Frost-free period: 137 to 276 days

**Map Unit Description**  
Lafette, (brackish marsh), and similar soils: 70 percent  
Axi, (salt marsh), and similar soils: 20 percent  
Other components: 5 percent

**Description of Lafette, (brackish marsh)**

**Setting**  
Landform: Tidal flats  
Landform position (two-dimensional): Toe/slope  
Landform position (three-dimensional): Op  
Down-slope shape: Concave  
Across-slope shape: Concave  
Parent material: Herbaceous plant remains over mineral soils

**Properties and qualities**  
Slope: 3 to 1 percent  
Depth to restrictive feature: More than 80 inches  
Drainage class: Very poorly drained  
Capacity of the root lining layer to transmit water (flat): Very low to moderately low (2.00 to 4.00 in/hr)  
Depth to water table: About 0 inches  
Frequency of flooding: Frequent  
Frequency of ponding: Frequent  
Minimum salinity: Very slightly saline to slightly saline (4.0 to 6.0 mmhos/cm)  
Sodium adsorption ratio, maximum: 13.0  
Available water capacity: Very high (about 19.1 inches)

**Interpretive groups**  
Land capability (nonirrigated): 1w

**Typical profile**  
0 to 75 inches: Muck  
75 to 80 inches: Clay

**Description of Axi, (salt marsh)**

**Setting**  
Landform: Tidal flats  
Landform position (two-dimensional): Toe/slope



# Off-Site Methods

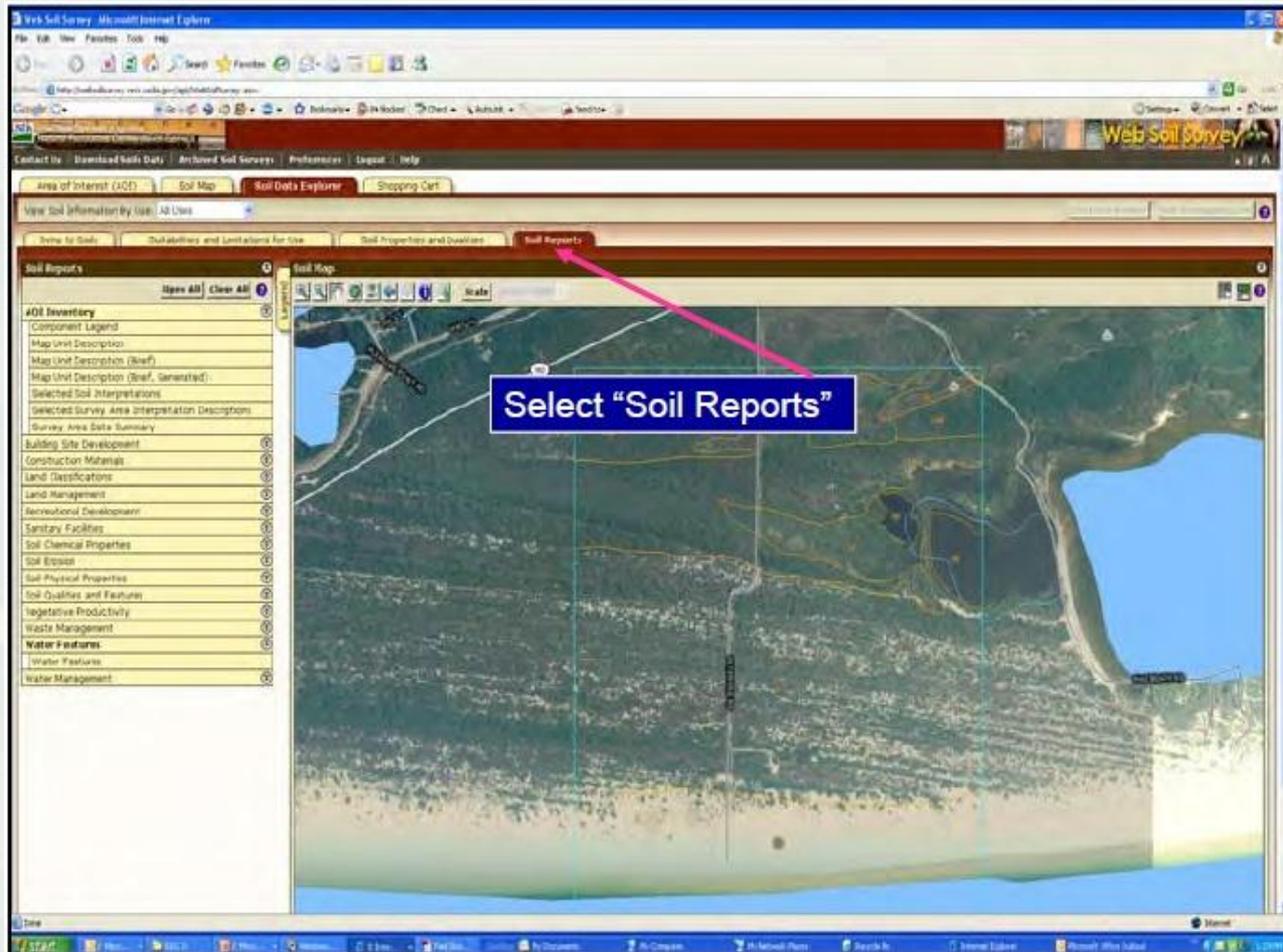
**Select "Soil Data Explorer"**

Map Unit	Map Unit Name	Area in AOI	Percent of AOI
Co	Coastal beaches	103.4	14.1%
LoB	Lathwood sand, 0 to 8 percent slopes	33.1	4.5%
Lo	Lathwood sand	113.9	15.5%
LoB	Lo sand, 0 to 8 percent slopes	14.4	1.9%
Lo	Lo sand	289.2	39.4%
Lo	Lo sand, non-Muck complex	289.2	39.4%
Td	Total marsh	36.7	5.0%
W	Water	14.3%	
Totals for Area of Interest (AOI)		731.5	100.0%



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# Off-Site Methods



# Off-Site Methods

The screenshot displays the Web Soil Survey web application. The interface includes a top navigation bar with links like 'Area of Interest (AOI)', 'Soil Map', and 'Soil Data Explorer'. A central map shows a geographical area with a green rectangular selection box. On the left, a sidebar menu lists various data layers. A blue callout box with white text and pink arrows points to the 'Hydric Soils' option under the 'Land Classifications' section and the 'Water Features' option under the 'Water Features' section of the menu.

**Note: "Hydric Soils" under "Land Classifications" and "Water Features" menus**



# Off-Site Methods

Example – Hydric Soils

The screenshot displays the Web Soil Survey web application. The 'Soil Reports' sidebar on the left contains a list of report categories. The 'Hydric Soils' section is highlighted in red. Within this section, the 'View Soil Report' button is indicated by a pink arrow and a blue callout box containing the text: 'Select "Hydric Soils," then "View Soil Report"'. The main window shows a satellite map of a landscape with a river and various soil types overlaid.



# Off-Site Methods

## Example – Hydric Soils

**Hydric Soils listed for this AOI**

**Landforms and hydric soils criteria**

**Explanation of hydric soils**

Map symbol and map unit name	Component	Percent of map soil	Landforms	Hydric criteria
C1-Coastal beach	Iron, (Bucristor)	1 Swales		2B1
U1-U Liveoak sand, 0 to 5 percent slopes	Hummer	1 Marine terraces		2B1
	Kayboro, (panico)	5 Depressions		1, 2
L1-Leon sand	Leon, (hydric)	41 Depressions		2B1
	Kayboro, (panico)	15 Depressions		1, 2
B1-B1 kumka sand, 0 to 5 percent slopes		3 Marine terraces		2B1
	Leon, (hydric)	5 Depressions		2B1
B1-B1 kumka sand, 5 to 10 percent slopes	Iron, (Bucristor)	15 Swales		2B1
	Corolla	15 Depressions		2A
	Kayboro, (panico)	5 Depressions		1, 2
T1-T1 Total marsh	Lafitte, (brackish marsh)	70 Total flats		1, 3, 4
	Iron, (salt marsh)	20 Total flats		2B1
	Livy	5 Backswamps		2B1, 3, 4

**Description - Hydric Soils**

**Hydric Soils**

The table lists the map unit components that are listed as hydric soils in the survey area. This list can help in planning field work. However, on-site investigation is recommended to determine the hydric soils in a specific site (National Research Council, 1991; Hurt and others, 2002).

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (soakwater and surface) (USEPA, 1991; National Research Council, 1991; Turner, 1981). Criteria for all of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTECHS) as soils that, formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the soil (Peters Register, 1999). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTECHS definition identifies general soil properties that are associated with wetlands. In order to determine whether a specific soil is a hydric soil or not, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify these estimated soil properties unique to hydric soils have been established (Peters Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 2000) and in the "Soil Survey Manual" (Soil Survey Center Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make on-site determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vaisala, 2006).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. The depth may be greater if determination of an appropriate indicator is required. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the pedogenic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and identify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if a least one of the approved indicators is present.



# Off-Site Methods

**Example – Water Features**

The screenshot displays the Web Soil Survey web application. The left-hand navigation pane is expanded to show the 'Water Features' section. A blue callout box with a pink arrow points to the 'View Soil Report' button within this section. The main area of the page shows a satellite map of a landscape with a river and a lake, overlaid with a grid and various data layers.

Select "Water Features,"  
then "View Soil Report"



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# Off-Site Methods

**Example – Water Features**

**Water Features listed for this AOI.**  
**Water table, ponding, and flooding characteristics.**  
**Explanation of Water Features listed below.**  
**(next slide)**

Map soil symbol and soil name	Hydrologic group	Surface water	Month	Water Table		Ponding Duration	Frequency	Flooding	
				Upper limit Ft.	Lower limit Ft.			Duration	Frequency
<b>Co—Coastal beaches</b>									
Coastal	A	—	January	—	—	—	None	Brief	Rare
	A	—	February	—	—	—	None	Brief	Rare
	A	—	March	—	—	—	None	Brief	Rare
	A	—	April	—	—	—	None	Brief	Rare
	A	—	May	—	—	—	None	Brief	Rare
	A	—	June	—	—	—	None	Brief	Rare
	A	—	July	—	—	—	None	Brief	Rare
	A	—	August	—	—	—	None	Brief	Rare
	A	—	September	—	—	—	None	Brief	Rare
	A	—	October	—	—	—	None	Brief	Rare
	A	—	November	—	—	—	None	Brief	Rare
	A	—	December	—	—	—	None	Brief	Rare
<b>Beaches</b>									
	D	—	January	0.0-4.0	>4.0	—	None	Long	Frequent
	D	—	February	0.0-4.0	>4.0	—	None	Long	Frequent
	D	—	March	0.0-4.0	>4.0	—	None	Long	Frequent
	D	—	April	0.0-4.0	>4.0	—	None	Long	Frequent
	D	—	May	0.0-4.0	>4.0	—	None	Long	Frequent
	D	—	June	0.0-4.0	>4.0	—	None	Long	Frequent
	D	—	July	0.0-4.0	>4.0	—	None	Long	Frequent
	D	—	August	0.0-4.0	>4.0	—	None	Long	Frequent
	D	—	September	0.0-4.0	>4.0	—	None	Long	Frequent
	D	—	October	0.0-4.0	>4.0	—	None	Long	Frequent
	D	—	November	0.0-4.0	>4.0	—	None	Long	Frequent
	D	—	December	0.0-4.0	>4.0	—	None	Long	Frequent
<b>U3—Littoral sand, 0 to 2 percent slopes</b>									
Lakewood, (barbata)	A	—	Jan-Dec	—	—	—	None	—	—
<b>L4—Leon sand</b>									
Leon, (hybr)	D	—	January	0.0	>4.0	0.1-2.0	Brief	Frequent	None
	D	—	February	0.0	>4.0	0.1-2.0	Brief	Frequent	None
	D	—	March	0.0	>4.0	0.1-2.0	Brief	Frequent	None
	D	—	April	0.0	>4.0	0.1-2.0	Brief	Frequent	None
	D	—	May	0.0	>4.0	0.1-2.0	Brief	Frequent	None
	D	—	June	0.0	>4.0	0.1-2.0	Brief	Frequent	None



# Off-Site Methods

Web Soil Survey - Microsoft Internet Explorer

File Edit View Favorites Tools Help

http://websoilsurvey.sc.egov.usda.gov/App/HomePage.nsf

D	—	August	0.0	>4.0	0.1-1.0	brief	Frequent	Very brief	Frequent
D	—	September	0.0	>4.0	0.1-1.0	brief	Frequent	Very brief	Frequent
D	—	October	0.0	>4.0	0.1-1.0	brief	Frequent	Very brief	Frequent
D	—	November	0.0	>4.0	0.1-1.0	brief	Frequent	Very brief	Frequent
D	—	December	0.0	>4.0	0.1-1.0	brief	Frequent	Very brief	Frequent
W-Water	Water	—	—	—	—	—	None	—	—

**Explanation of Water Features**

**Description - Water Features**

**Water Features**  
 This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations. Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

- Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
- Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
- Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water in soils of moderately fine texture or the texture. These soils have a slow rate of water transmission.
- Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

The months in the table indicate the portion of the year in which a water table, ponding, and/or flooding is most likely to be a concern.

Water table refers to a saturated zone in the soil. The water features table indicates, by month, depth to the top (upper limit) and base (lower limit) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates surface water depth and the duration and frequency of ponding. Duration is expressed as very brief if less than 2 days, brief if 2 to 7 days, long if 7 to 30 days, and very long if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. None means that ponding is not probable, rare that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent in any year), occasional that it occurs on the average, once or less in 2 years (the chance of ponding is 5 to 10 percent in any year), and frequent that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 10 percent in any year).

Flooding is the temporary submergence of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and frequency are estimated. Duration is expressed as extremely brief if 0.1 hour to 4 hours, very brief if 4 hours to 2 days, brief if 2 to 7 days, long if 7 to 30 days, and very long if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. None means that flooding is not probable, very rare that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 0.1 percent in any year), rare that it is unlikely but possible under unusual weather conditions (the chance of flooding is 0.1 to 0.5 percent in any year), occasional that it occurs infrequently under normal weather conditions (the chance of flooding is 0.5 to 5 percent in any year), frequent that it is likely to occur often under normal weather conditions (the chance of flooding is more than 5 percent in any year but is less than 10 percent in all months in any year), and very frequent that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 10 percent in all months of any year).

The information is based on evidence in the soil profile, namely the texture of gravel, sand, silt, or clay reported by Rockwater; frequent decrease in organic matter content with increasing depth; and the 0 to 10 horizon designation.

Also considered are local information about the extent and levels of flooding and the relation of each soil in the landscape to historic flood information on the extent of flooding based on soil data and specific maps that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

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# Off-Site Methods

Example – Drainage Class

The screenshot displays the Web Soil Survey application. On the left, a list of soil properties is shown, with the 'Drainage Class' property highlighted. A blue callout box with arrows pointing to the 'Soil Properties and Qualities' list and the 'Drainage Class' property contains the text: 'Select "Soil Properties and Qualities," then "Open All," then "Drainage Class"'. The main map area shows a drainage class map with three distinct regions: a blue region labeled 'Poorly drained marsh', a large red region labeled 'Well-drained sand', and a green region. The 'View Options' section at the bottom left of the map area shows 'View Description' and 'View Rating' buttons.

Soil Properties and Qualities

- Soil Chemical Properties
  - Calcium Carbonate (CaCO<sub>3</sub>)
  - Cation-Exchange Capacity (CEC)
  - Effective Cation-Exchange Capacity (ECEC)
  - Electrical Conductivity (EC)
  - Gypsum
  - pH (1 to 1 Water)
  - Sodium Adsorption Ratio (SAR)
- Soil Texture Factors
  - E Factor, Cook Free
  - E Factor, Whole Soil
  - T Factor
  - Wind Erodibility Group
  - Wind Erodibility Index
- Soil Physical Properties
  - Available Water Capacity
  - Available Water Supply, 0 to 100 cm
  - Available Water Supply, 0 to 150 cm
  - Available Water Supply, 0 to 25 cm
  - Available Water Supply, 0 to 80 cm
  - Bulk Density, 15 Bar
  - Bulk Density, One-Tenth Bar
  - Bulk Density, One-Third Bar
  - Linear Extensibility
  - Liquid Limit
  - Organic Matter
  - Percent Clay
  - Percent Sand
  - Percent Silt
  - Plasticity Index
  - Saturated Hydraulic Conductivity (ksat)
  - Saturated Hydraulic Conductivity (ksat), Standard Classes
  - Surface Texture
  - Water Content, 15 Bar
  - Water Content, One-Third Bar
- Soil Qualities and Features
  - AKSHTC Group Classification (Surface)
  - Depth to a Selected Soil Restrictive Layer
  - Depth to Any Soil Restrictive Layer
- Drainage Class

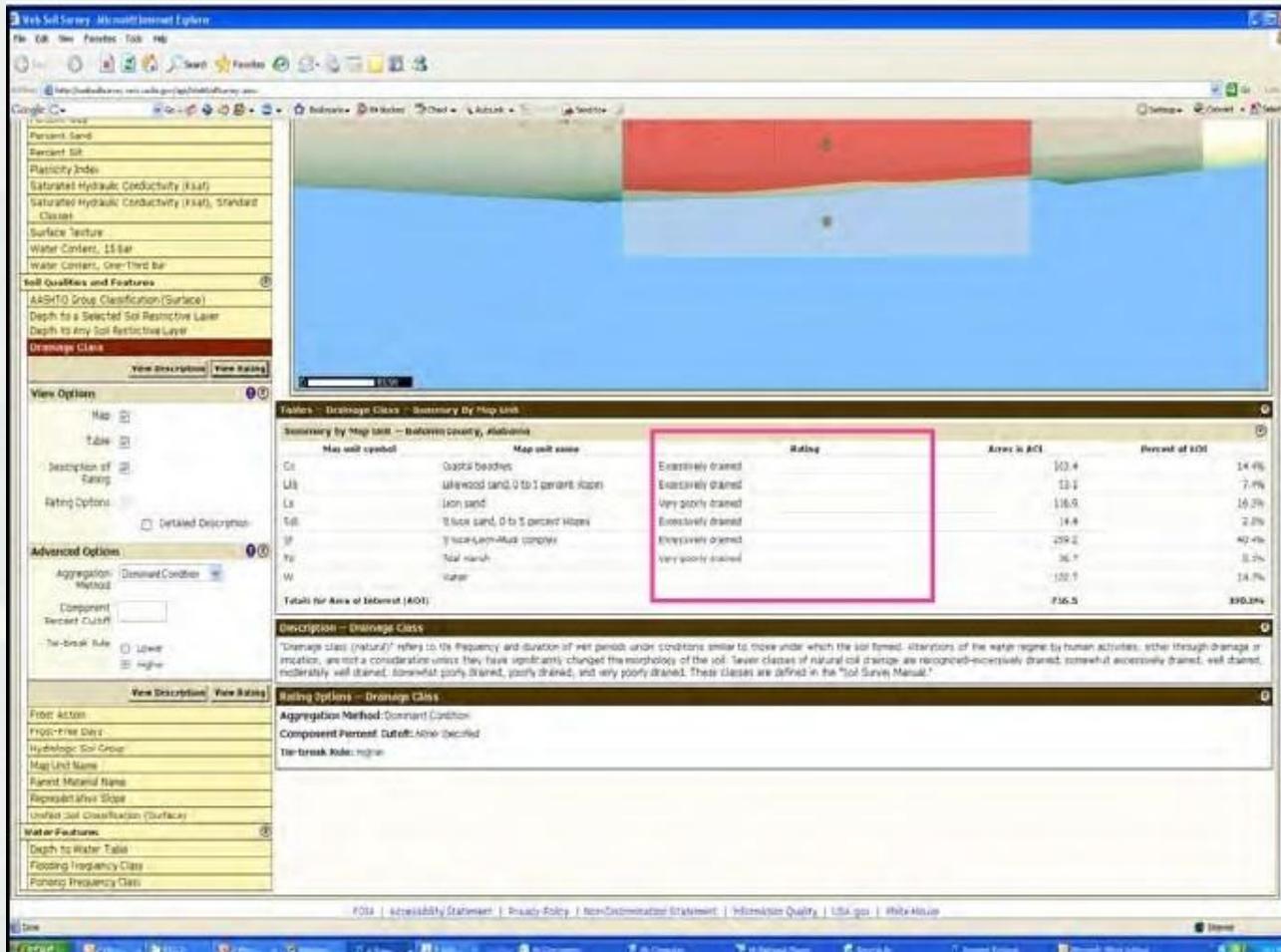
View Options

Poorly drained marsh

Well-drained sand



# Off-Site Methods



# Off-Site Methods

Example – Hydric Rating

Select "Suitabilities and Limitations," then "Open All," then "Hydric Rating"

Hydric marsh

Partially hydric sand



# Off-Site Methods

Web Soil Survey - Microsoft Internet Explorer

http://websoilsurvey.sc.egov.usda.gov/App/SoilDetails.aspx

Summary - Hydric Rating by Map Unit - Summary by Map Unit

Summary by Map Unit - Baldwin County, Alabama

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
L1	L1: Lateral berms	Variable hydric	112.4	14.4%
L2	L2: Lateralwood sand, 0 to 5 percent slopes	Partially hydric	53.9	7.4%
L3	L3: Lateral sand	Partially hydric	116.5	15.2%
S1	S1: Sand, 7 to 15 percent slopes	Partially hydric	14.4	2.0%
M	M: M: Sand-clay-loam silt loam	Partially hydric	297.7	40.4%
T1	T1: T1: Marsh	All hydric	35.1	5.2%
W	W: Water	Not hydric	102.7	14.2%
<b>Totals for Area of Interest (AOI)</b>			<b>716.5</b>	<b>100.0%</b>

**Explanation of Hydric Ratings**

**Description - Hydric Rating by Map Unit**

This rating indicates the proportion of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of non-hydric components in the higher positions on the landscape, and map units that are made up dominantly of non-hydric soils may have small areas of minor hydric components in the lower positions on the landscape. Each map unit is designated as "All hydric," "Partially hydric," "Not hydric," or "Unknown hydric," depending on the rating of its respective components.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or standing long enough during the growing season to develop anaerobic conditions in the upper part (National Register, 1999). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition includes general soil properties that are associated with wetness. In order to determine whether a specific soil is hydric and identify the soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2004) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make precise determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Mutz and Taylor, 2006).

**Determinants:**

Federal Register, July 23, 1994. Changes in Hydric Soils of the United States.  
 Federal Register, September 18, 2002. Hydric Soils of the United States.  
 Mutz, G. A., and L. M. Taylor, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.  
 Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service, U.S. Department of Agriculture Handbook 60.  
 Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436.  
 Soil Survey Staff. 2004. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

**Making Options - Hydric Rating by Map Unit**

**Aggregation Method:** absence/presence

**Tie-break Rule:** none

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# Data Sources on the Web

- Aerial imagery viewers
  - ▶ <http://earth.google.com>
  - ▶ <http://www.bing.com/maps>
  - ▶ <http://maps.live.com>
- USGS maps, photos, data
  - ▶ <http://ask.usgs.gov>
  - ▶ <http://nationalmap.gov/index.html>
  - ▶ <http://seamless.usgs.gov/index.php>
- Web Soil Survey reports and data
  - ▶ <http://websoilsurvey.nrcs.usda.gov/app/>



# Off-Site Summary

- Aerial Imagery
  - ▶ Current and historical
- USGS Map
  - ▶ Transportation data
  - ▶ Hydrology
  - ▶ Government boundaries
  - ▶ HUC
- NWI Map
  - ▶ Water resource type
  - ▶ Hydrology information
- Web Soil Survey
  - ▶ Soil series
  - ▶ Hydric soil status
  - ▶ Depth to restrictive area
  - ▶ Drainage class



# Field Delineations

- Equipment and Materials:
  - ▶ Corps of Engineers Regional Supplement
  - ▶ Base map
  - ▶ Copies of data form
  - ▶ Wetland plant list
  - ▶ Shovel, soil auger, or probe
  - ▶ Measuring tape
  - ▶ Munsell soil color book
  - ▶ Stakes or flagging tape
  - ▶ Navigation aides (e.g., compass, GPS)

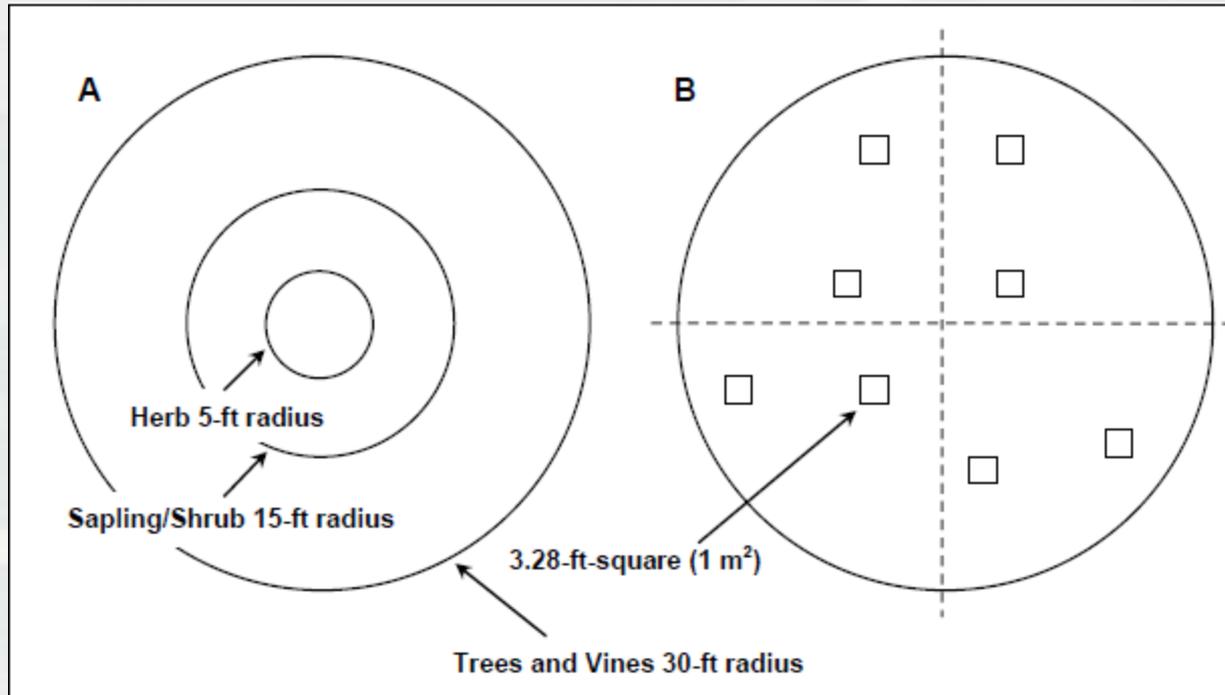


# Routine Method

- Use the routine method for small areas when:
  - ▶ Project area is small (<5 acres)
  - ▶ Plant communities are homogeneous
  - ▶ Plant community boundaries are abrupt
  - ▶ Project is not controversial



# Vegetation Strata



# Vegetation Strata

- Sampling plots
  - ▶ Same plant community
  - ▶ Should not extend outside a plant community
- Shape of sampling plots
  - ▶ Typically a circular plot with a different radius relative to the strata being sampled
  - ▶ Can be rectangular if property rights conflict with circular plot
- Hydrophytic Vegetation Indicators:
  - ▶ Rapid Test (If this test fails, proceed to Dominance Test)
  - ▶ Dominance Test (If the 50/20 rule fails, proceed to Prevalence Index)
  - ▶ Prevalence Index (If result is  $\leq 3.0$ , proceed to Morphological Adaptations)
  - ▶ Morphological Adaptations (e.g. cypress knees; if this fails, the vegetation is not hydric)



# Data Forms

## Vegetation Section of Data Form

**VEGETATION – Use scientific names of plants. (Arid West Version 2.0)**

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:	
1. _____				Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)	
2. _____				Total Number of Dominant Species Across All Strata: _____ (B)	
3. _____				Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (AB)	
4. _____					
			= Total Cover		
Sapling/Shrub Stratum (Plot size: _____)				Prevalence Index worksheet:	
1. _____				Total % Cover of	Multiply by:
2. _____				OBL species _____	× 1 = _____
3. _____				FACW species _____	× 2 = _____
4. _____				FAC species _____	× 3 = _____
5. _____				FACU species _____	× 4 = _____
			= Total Cover	LPL species _____	× 5 = _____
				Column Totals _____	(A) _____ (B) _____
				Prevalence Index = B/A = _____	
Herb Stratum (Plot size: _____)				Hydrophytic Vegetation Indicators:	
1. _____				___ Dominance Test is ≥ 50%	
2. _____				___ Prevalence Index is ≥ 0.1	
3. _____				___ Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)	
4. _____				___ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)	
5. _____					
6. _____					
7. _____					
8. _____					
			= Total Cover		
Woody Vine Stratum (Plot size: _____)				<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
1. _____					
2. _____					
			= Total Cover		
% Bare Ground in Herb Stratum _____		% Cover of Biotic Crust _____		<b>Hydrophytic Vegetation Present?</b> Yes _____ No _____	
Remarks: _____					



# Hydric Soils

- *Hydrology*—Is standing water observed on the site or is water observed in the soil pit? What is the depth of the water table in the area? Is there indirect evidence of ponding or flooding?
- *Slope*—Is the site level or nearly level so that surface water does not run off readily, or is it steeper where surface water would run off from the soil?
- *Slope shape*—Is the surface concave (e.g., depressions), where water would tend to collect and possibly pond on the soil surface? On hillsides, are there convergent slopes (Figure 4), where surface or groundwater may be directed toward a central stream or swale? Or is the surface or slope shape convex, causing water to run off or disperse?



# Hydric Soils cont.

- *Landform*—Is the soil on a low terrace or floodplain that may be subject to seasonal high water tables or flooding? Is it at the toe of a slope (Figure 5) where runoff may tend to collect or groundwater emerge at or near the surface? Has the microtopography been altered by cultivation?
- *Soil materials*— Is there a restrictive layer in the soil that could slow or prevent the infiltration of water, perhaps resulting in a perched water table or hillslope seep? This could include consolidated bedrock, cemented layers such as duripans and petrocalcic horizons, layers of silt or substantial clay content, or strongly contrasting soil textures (e.g., silt over sand).
- *Vegetation*—Does the vegetation at the site indicate wetter conditions than at other nearby sites, or is it similar to what is found at nearby upland sites?



# Hydric Soils

- Not a registered soil scientist:
  - ▶ Web soil survey... do not just write soils were not pulled.
  - ▶ 87' manual, on-site inspection (Step 3)- ... it is only necessary to confirm that there has been no recent hydrologic alteration of the area:
    - A) The entire project area is occupied by a plant community or communities in which all dominant species are OBL
    - B) The project area contains two or more plant communities, all of which are dominated by OBL and/or FACW species, and the wetland-nonwetland boundary is abrupt.
  - ▶ Step 4
    - Hydric soils can be assumed to be present if either a or b or Step 3 applies
    - If evidence of altered hydrology occurs, proceed to step 5 , to determine whether hydric soils are present (physically identify)
  - ▶ However, if the hydrology indicators and vegetation do not provide a clear and concise explanation of the project area, the Corps of Engineers may request that soils be identified on-site despite the web soil survey being provided.





# Hydrology Indicators

- The list can be found in the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0).



# List of Hydrology Indicators

Indicator	Category	
	Primary	Secondary
<b>Group A – Observation of Surface Water or Saturated Soils</b>		
A1 – Surface water	X	
A2 – High water table	X	
A3 – Saturation	X	
<b>Group B – Evidence of Recent Inundation</b>		
B1 – Water marks	X	
B2 – Sediment deposits	X	
B3 – Drift deposits	X	
B4 – Algal mat or crust	X	
B5 – Iron deposits	X	
B7 – Inundation visible on aerial imagery	X	
B9 – Water-stained leaves	X	
B11 – Salt crust	X	
B13 – Aquatic invertebrates	X	
B6 – Surface soil cracks		X
B8 – Sparsely vegetated concave surface		X
B10 – Drainage patterns		X
<b>Group C – Evidence of Current or Recent Soil Saturation</b>		
C1 – Hydrogen sulfide odor	X	
C2 – Dry-season water table	X	
C4 – Presence of reduced iron	X	
C7 – Thin muck surface	X	
C3 – Oxidized rhizospheres along living roots	X	X (where tilled)
C8 – Crayfish burrows		X
C9 – Saturation visible on aerial imagery		X
<b>Group D – Evidence from Other Site Conditions or Data</b>		
D2 – Geomorphic position		X
D5 – FAC-neutral test		X
D7 – Frost-heave hummocks		X (LRR F)



# Hydrology Indicators

- Indicator A1 Surface water:
  - ▶ Direct/visual observation of surface water during a site visit (ponding or flooding)
  - ▶ Recent precipitation
    - Naturally Problematic
    - Normal circumstances not present
- Indicator A2 High water table:
  - ▶ Must be within first 12 inches of the soil.
  - ▶ Time must be allowed for water to infiltrate into the hole, in order for the water table to stabilize.
  - ▶ Normal circumstances may not mean “inundation”
  - ▶ Do not penetrate the restrictive layer



# Hydrology Indicators

- Indicator A3 Saturation:
  - ▶ Water “glistening” on soil surface
  - ▶ Is there an existing water table?
  - ▶ If saturation is present without an existing water table, this must be explained in the remarks as it may be a result of recent rainfall or the restrictive soil layer.
  
- ▶ If surface water is present and not naturally problematic, all three indicators are present
  - Surface water
  - High water table
  - Saturation



# Hydrology Section

## Hydrology Section of Data Form

### HYDROLOGY (Arid West Version 2.0)

#### Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1) (**Nonriverine**)
- Sediment Deposits (B2) (**Nonriverine**)
- Drift Deposits (B3) (**Nonriverine**)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)

- Salt Crust (B11)
- Biotic Crust (B12)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- Water Marks (B1) (**Riverine**)
- Sediment Deposits (B2) (**Riverine**)
- Drift Deposits (B3) (**Riverine**)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

#### Field Observations:

- Surface Water Present? Yes  No  Depth (inches): \_\_\_\_\_
- Water Table Present? Yes  No  Depth (inches): \_\_\_\_\_
- Saturation Present? Yes  No  Depth (inches): \_\_\_\_\_  
(includes capillary fringe)

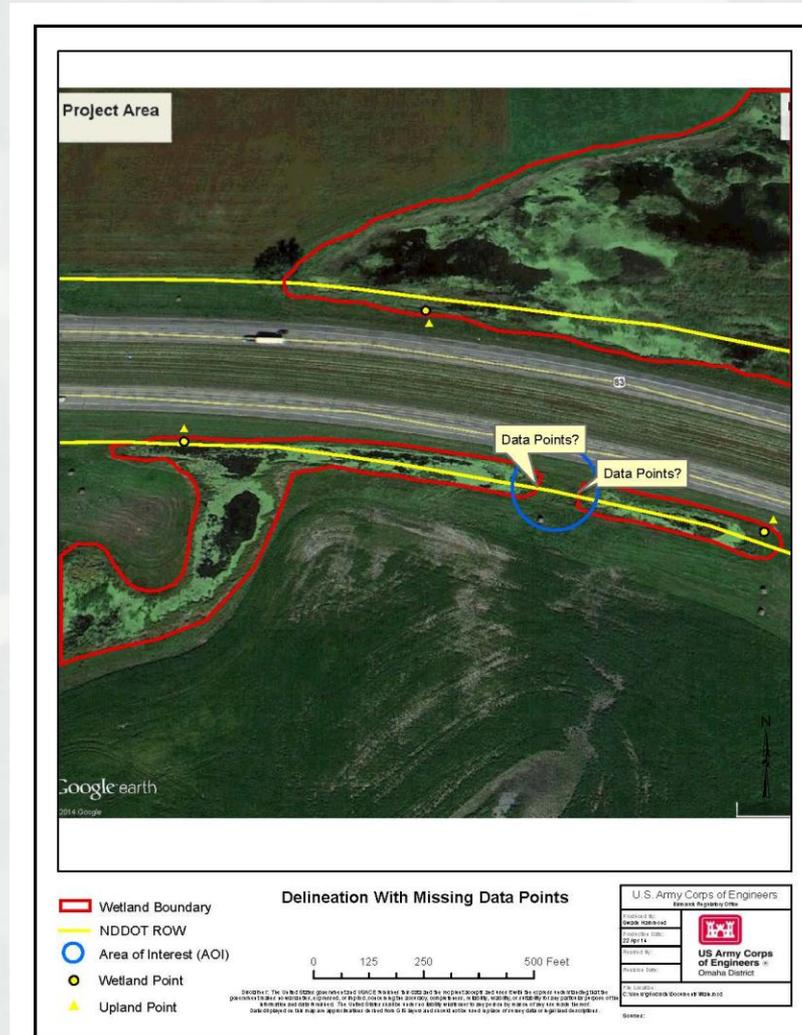
Wetland Hydrology Present? Yes  No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:



# Mapped Examples



# Mapped Examples



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