USDA NRCS

United States Department of Agriculture
Natural Resources Conservation Service

2009 Soils Planner

Field Indicators of Hydric Soils in the United States

Conservation... Our Purpose. Our Passion.

Inspired by a shared passion for conservation, the United States Department of Agriculture's Natural Resources Conservation Service (NRCS) collaborates with farmers, ranchers, communities, and others to protect natural resources on private lands. We help people help the land through scientifically based, locally led voluntary conservation efforts, resulting in healthy soils, clean air and water, and improved wildlife habitat.

Wetlands are critical to a healthy environment and the productive lands on which we all depend. Wetlands provide essential wildlife habitat, detain floodwaters to reduce flooding, and retain carbon and nutrients essential to our soils.

This planner focuses on NRCS' interagency efforts to produce a coordinated system of identifying wetland soil features. These common indicators will enable us to better protect our Nation's wetland resources for the future.

Arlen L. Lancaster
Chief
Natural Resources Conservation Service
United States Department of Agriculture

The Soil Science Society of America (SSSA) is an educational organization with more than 6,000 scientists and professionals in over 80 countries committed to the advancement of soil science. The SSSA supports education and research to protect and understand soils for the welfare of our planet. In celebration of the International Year of Planet Earth 2007-2009 and the first year of the Smithsonian Soils Exhibition, "Dig It!," at the National Museum of Natural History in Washington DC, SSSA is pleased to continue our active partnership with the USDA-NRCS and the National Cooperative Soil Survey in producing educational materials such as this soils planner for our members, the public, and the scientific community.

Paul M. Bertsch
President
Soil Science Society of America

The U.S. Environmental Protection Agency (EPA), in partnership with Federal agencies and State, local, and Tribal governments, is responsible for restoring and maintaining the chemical, physical, and biological integrity of the Nation's waters, including wetlands. Section 404 of the Clean Water Act provides the primary guidelines for regulating the discharge of dredged or fill material into waters and wetlands of the United States. EPA works with the U.S. Army Corps of Engineers and NRCS on scientific indicators of hydric soils for identification and regulation of wetlands. We are pleased to join the soil science community in producing this 2009 Soils Planner, which celebrates the work of many scientists in characterizing and preserving our Nation's wetland soil resources.

Craig Hooks
Director
Office of Wetlands, Oceans and Watersheds
United States Environmental Protection Agency

The Clean Water Act regulates discharges of fill for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and mining projects in U.S. waters. The U.S. Army Corps of Engineers is regionalizing its procedures for identifying and delineating wetlands, including the use of hydric soil field indicators shown in this planner. These hydric soil indicators demonstrate how interagency cooperation can produce tools that benefit the entire Nation.

Michael G. Ensch
Chief, Operations
Directorate of Civil Works
U.S. Army Corps of Engineers

Hydric soils are soils formed in wetlands.

A hydric soil is defined as:

> *"... a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part."* (59 Fed. Reg. 35680, 7/13/94)

Field indicators of hydric soils are visual properties associated with the chemical, physical, and biological processes that cause hydric soil formation. They are evident during both wet and dry seasonal periods. In certain wet soils, odor is also used as an indicator.

Specific colors, and the shapes and depths in which they appear in hydric soils, are primary indicators. These visual characteristics result from the chemical reactions caused by soil microbes in hydric soils. The microbes deplete the free oxygen in the soil through respiration, reducing nitrogen, then manganese and iron as energy sources.

Manganese creates a black color in the soil. Iron creates a yellowish or reddish color. Though oxidized manganese and iron do not dissolve in water, microbial respiration chemically reduces them and allows them to be dissolved in water, producing a gray or blue color.

As the minerals move with water in the soil, they may come in contact with oxygen and precipitate out of solution. In this case, manganese will turn black and iron will turn red or orange. If iron and manganese precipitate out together, a purple color is produced. Once iron and manganese are reduced in the soil, microbes use sulfur for energy, resulting in the odor of "rotten eggs." All of these properties are elements of hydric soil indicators.

Another indicator is a high concentration of organic matter. Organic matter decomposes into carbon dioxide and water slowly, due to anaerobic (without oxygen) conditions, which allow it to accumulate. Hydric soils with high organic matter concentration are greasy and black in color.

Practitioners use indicators to identify hydric soils in the field. Hydric soils, hydrology, and vegetation are the three parameters used to delineate wetlands protected by the Clean Water Act and the National Food Security Act. There are three categories of hydric soil indicators: all soils, sandy soils, and loamy/clayey soils. All together, there are 45 indicators; this planner features 12 of the more commonly used indicators. For more information on hydric soils and more detailed information on field indicators and hydric soils and how they are used, visit **http://soils.usda.gov/use/hydric/**.

Glossary

Anaerobic—A condition in which molecular oxygen is virtually absent from the soil.

Chroma—The saturation of a color. Low chroma means low saturation of color, closer to black or gray.

Depleted Matrix —Gray matrices result from the reduction and translocation of iron and/or manganese. They have:

1. Matrix value of 5 or more and chroma of 1 or less with or without redox concentrations occurring as soft masses and/or pore linings; or
2. Matrix value of 6 or more and chroma of 2 or less with or without redox concentrations occurring as soft masses and/or pore linings; or
3. Matrix value of 4 or 5 and chroma of 2 and 2 percent or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings; or
4. Matrix value of 4 and chroma of 1 and 2 percent or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings.

Fragmental Soil Material—Soil material consisting of at least 90 percent rock fragments.

Gleyed Matrix—A gleyed matrix has value 4 or more and chroma 2 or less and has yellow, green, yellow green, blue green, blue, or purple blue colors or are neutral (gray to white). In some places a gleyed matrix may also be a reduced matrix (see definition below).

Fe—Abbreviation for iron.

LRR—Land Resource Region. Geographic areas characterized by a particular pattern of soils, climate, water resources, and land use. Each LRR is assigned a different letter of the alphabet (A to Z), and is defined in USDA, Major Land Resource Areas (MLRA) of the United States, Agriculture Handbook 296.

Mn—Abbreviation for manganese.

Matrix Color—The dominant soil color. The term for other colors is "mottles."

MLRA—Major Land Resource Area. MLRAs identify areas of common land use, elevation, topography, climate, water resources, potential natural vegetation, and soils.

Redox concentrations—Bodies of apparent accumulation of Fe-Mn oxides. They occur as splotches of color in the soil. Iron is typically bright in color (similar to rust) and Mn is typically black in color. When Fe and Mn precipitate out together a dark reddish or purplish-black color usually results.

Redox Depletions—Bodies of low chroma (2 or less) having value of 4 or more (gray) where Fe-Mn oxides have been stripped or where both Fe-Mn oxides and clay have been stripped.

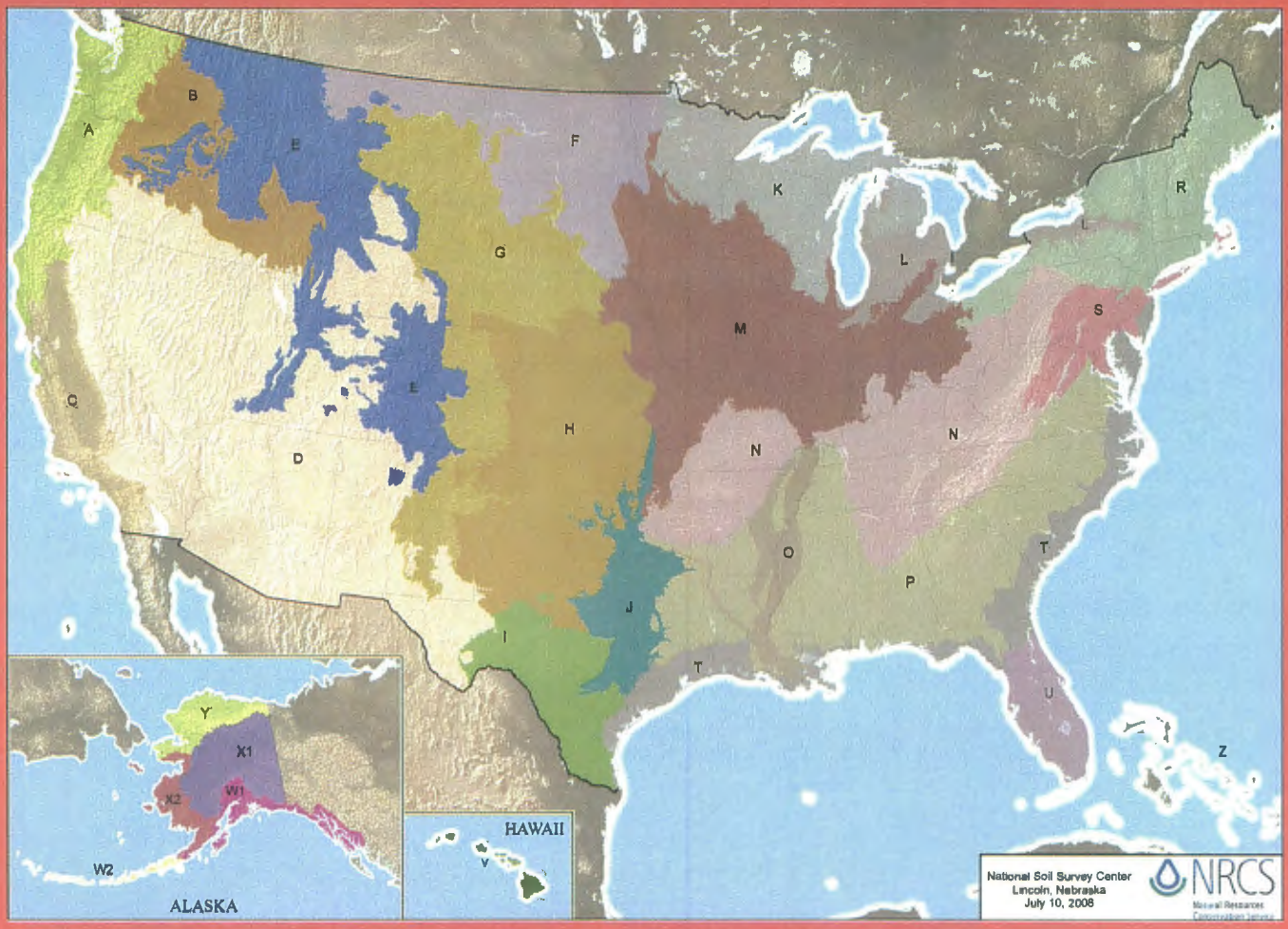
Redoximorphic Features—Features formed by the processes of reduction, translocation, and/or oxidation of Fe and Mn oxides; formerly called mottles and low-chroma colors. Redoximorphic features form many of the color patterns we use to identify hydric soils.

Reduced Matrix—A soil matrix that has low chroma and high value (gray), but in which the color changes in hue or chroma when the soil is exposed to air. A reduced matrix has reduced Fe in solution that oxidizes and changes color when exposed to oxygen.

Reduction—For the purpose of the Indicators, reduction occurs when the redox potential (Eh) is below the ferric-ferrous iron threshold as adjusted for pH. In hydric soils, this is when the transformation of ferric iron (Fe+++) to ferrous iron (Fe++) occurs.

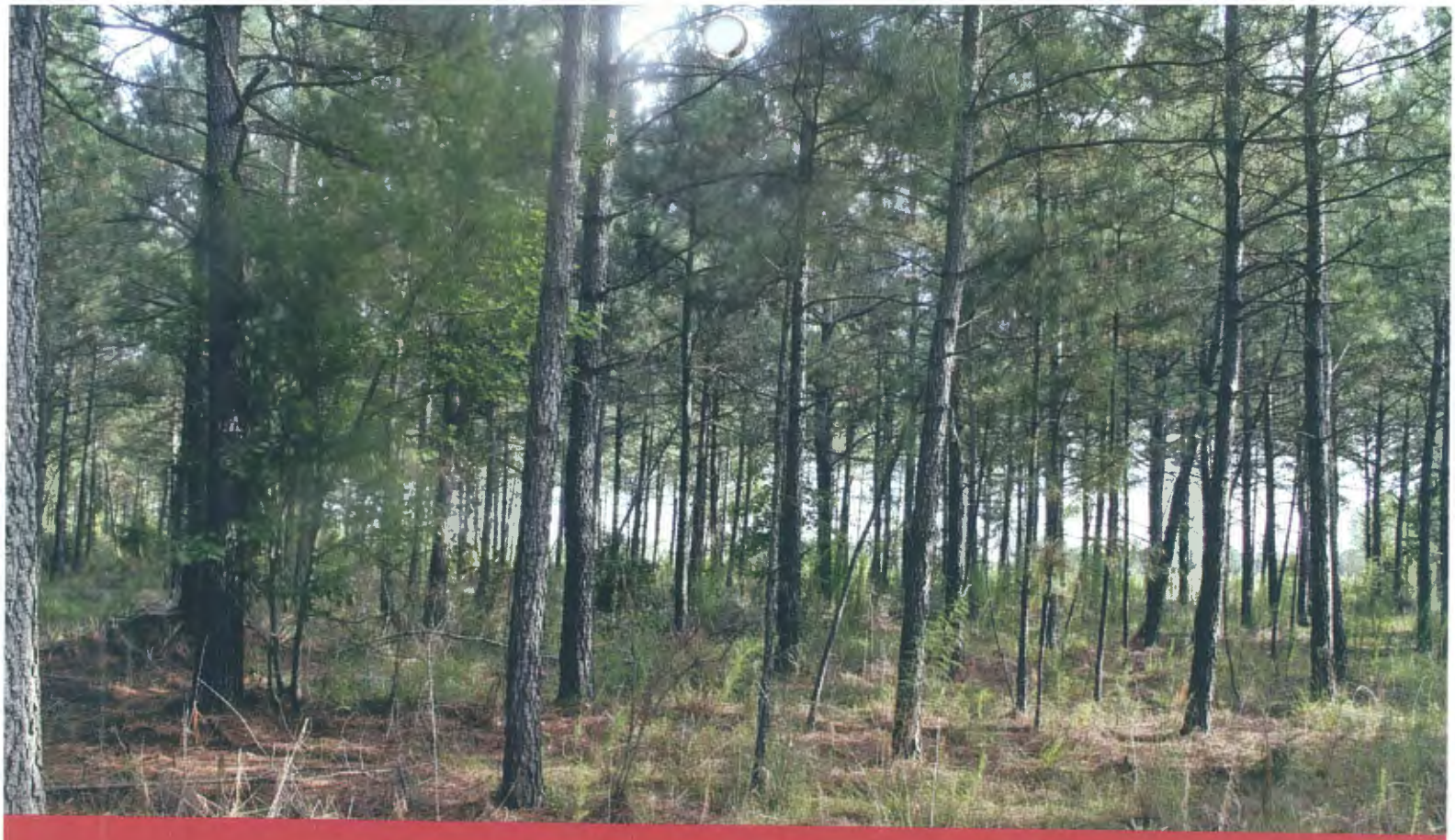
Value—The degree of lightness (high value) or darkness (low value) in color.

U.S. Land Resource Regions



This map uses letters to represent Land Resource Regions (LRRs) and will be referenced in each indicator description in the planner.

A - Northwestern Forest, Forage, and Specialty Crop Region
B - Northwestern Wheat and Range Region
C - California Subtropical Fruit, Truck and Specialty Crop Region
D - Western Range and Irrigated Region
E - Rocky Mountain Range and Forest Region
F - Northern Great Plains Spring Wheat Region
G - Western Great Plains Range and Irrigated Region
H - Central Great Plains Winter Wheat and Range Region
I - Southwest Plateau and Plains Range and Cotton Region
J - Southwestern Prairies Cotton and Forage Region
K - Northern Lake States Forest and Forage Region
L - Lake States Fruit, Truck Crop, and Dairy Region
M - Central Feed Grains and Livestock Region and Forest Region
N - East and Central Farming and Forest Region
O - Mississippi Delta Cotton and Feed Grains Region
P - South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock Region
Q - Pacific Basin Region
R - Northeastern Forage and Forest Region
S - Northern Atlantic Slope Diversified Farming Region
T - Atlantic and Gulf Coast Lowland Forest and Crop Region
U - Florida Subtropical Fruit, Truck Crop, and Range Region
V - Hawaii Region
W1 - Southern Alaska
W2 - Aleutian Alaska
X1 - Interior Alaska
X2 - Western Alaska
Y - Northern Alaska
Z - Caribbean Region



Depleted Matrix Indicator

The Depleted Matrix Indicator is the most commonly used indicator throughout the U.S., except Alaska.

F3. Depleted Matrix

For use in all LRRs, except for W, X, and Y. A layer that has a depleted matrix with 60 percent or more chroma of 2 or less, and has a minimum thickness of either:

a. 5 cm (2 inches) if the 5 cm is entirely within the upper 15 cm (6 inches) of the soil, or

b. 15 cm (6 inches), starting within 25 cm (10 inches) of the soil surface.

JANUARY

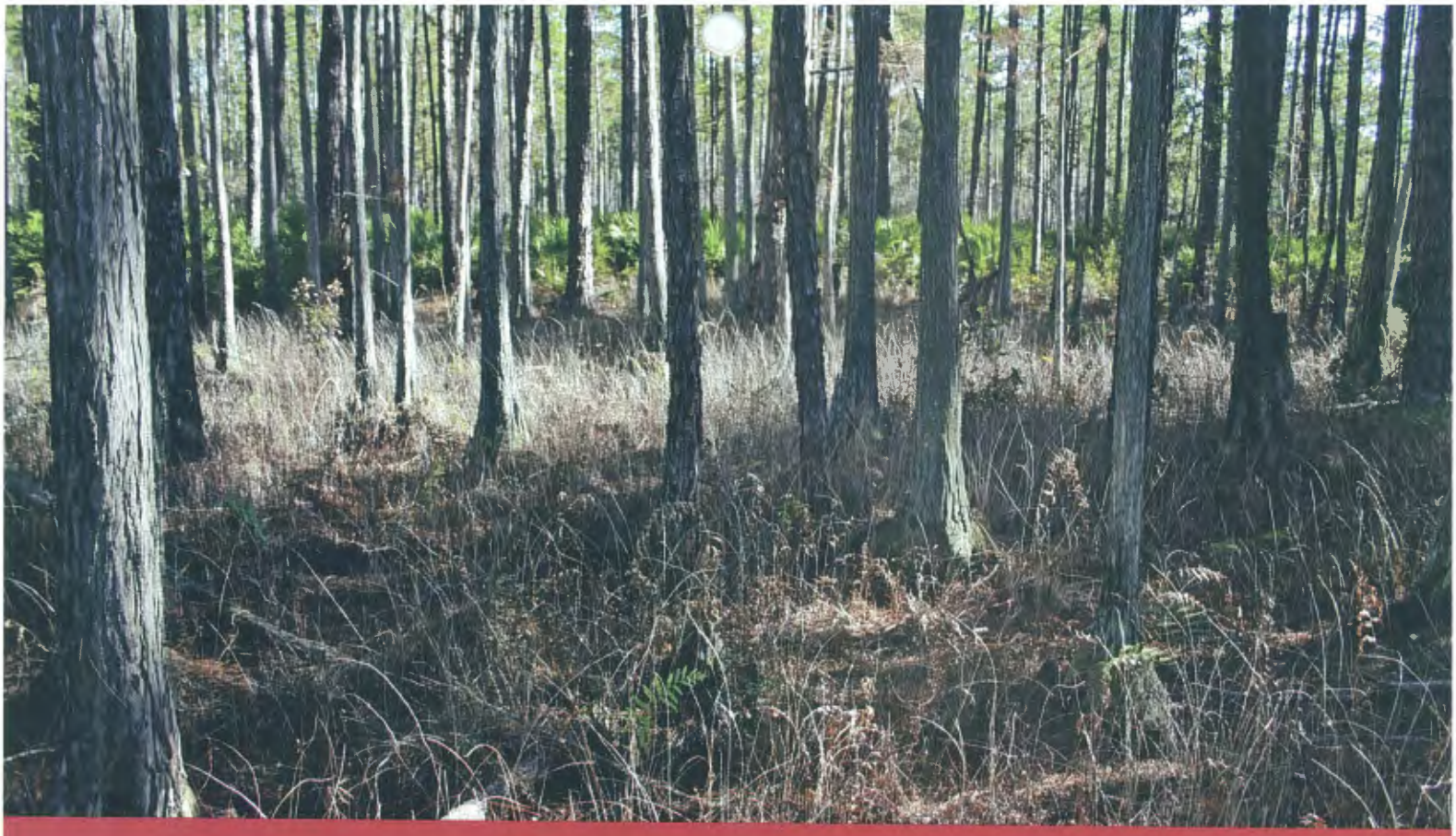
December

S	M	T	W	T	F	S
		1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

February

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

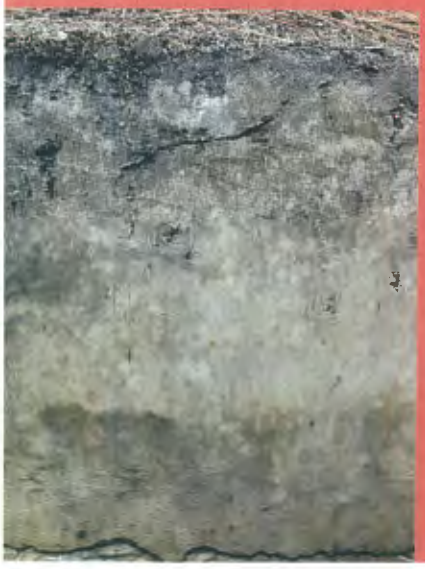
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
				1 New Year's Day	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19 Martin Luther King Jr.'s Birthday	20	21	22	23	24
25	26	27	28	29	30	31



Sandy Redox Indicator

Sandy Redox is a common indicator in sandy soils (loamy fine sand and coarser) throughout the U.S., except in Alaska and Hawaii.

S5. Sandy Redox
For use in all LRRs, except for V, W, X, and Y. A layer starting within 15 cm (6 inches) of the soil surface that is at least 10 cm (4 inches) thick and has a matrix with 60 percent or more chroma of 2 or less, with 2 percent or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings.



FEBRUARY

January

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

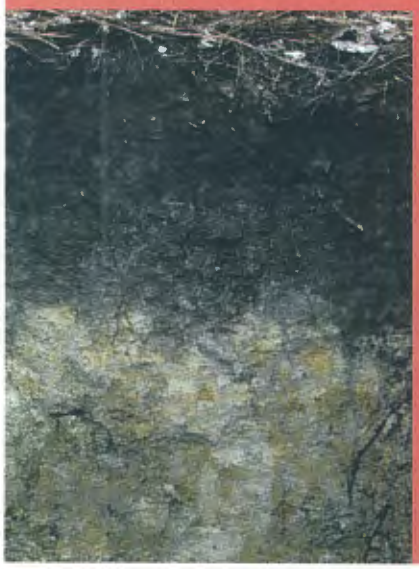
March

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2 World Wetlands Day	3	4	5	6	7
8	9	10	11	12	13	14
15	16 Presidents' Day	17	18	19	20	21
22	23	24	25	26	27	28

Depleted Below Dark Surface Indicator

Depleted Below Dark Surface is a common indicator throughout most of the U.S.



A11. Depleted Below Dark Surface
For use in all LRRs, except for W, X, and Y; for testing in LRRs W, X, and Y. A layer with a depleted or gleyed matrix that has 60 or more percent chroma of 2 or less, starting within 30 cm (12 inches) of the soil surface, and having a minimum thickness of either:

a. 15 cm (6 inches), or

b. 5 cm (2 inches) if the 5 cm consists of fragmental soil material.

Loamy or clayey layer(s) above the depleted or gleyed matrix must have value of 3 or less and chroma of 2 or less. Any sandy material above the depleted or gleyed matrix must have value of 3 or less and chroma of 1 or less, and at least 70 percent of the visible soil particles must be covered, coated, or similarly masked with organic material.

MARCH

February

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

April

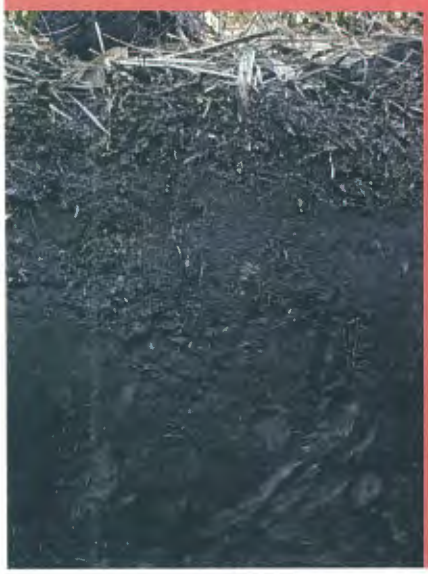
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Dark Surface Indicator

Dark Surface is a common indicator of sandy (loamy fine sand and coarser) soils throughout the East Coast, Puerto Rico, and Hawaii.

S7. Dark Surface
For use in LRRs N, P, R, S, T, U, V, and Z. A layer 10 cm (4 inches) or more, starting within the upper 15 cm (6 inches) of the soil surface and with a matrix value of 3 or less and chroma of 1 or less. At least 70 percent of the visible soil particles must be covered, coated, or similarly masked with organic material. The matrix color of the layer directly below the dark layer must have chroma of 2 or less.



APRIL

March

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

May

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22 Earth Day	23	24	25
26	27	28	29	30		

Redox Dark Surface Indicator

Redox Dark Surface is a common indicator throughout the U.S., except Alaska.

F6. Redox Dark Surface
For use in all LRRs, except for LRRs W, X, and Y; for testing in LRRs W, X, and Y. A layer that is at least 10 cm (4 inches) thick, is entirely within the upper 30 cm (12 inches) of the mineral soil, and has:

a. Matrix value of 3 or less and chroma of 1 or less and 2 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings, or

b. Matrix value of 3 or less and chroma of 2 or less and 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings.

MAY

April

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

June

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24/31	25 Memorial Day	26	27	28	29	30

Redox Depressions Indicator

Redox Depressions Indicator is used in closed depressions subject to ponding throughout the U.S., except Alaska.

F8. Redox Depressions
For use in all LRRs, except for LRRs W, X, and Y; for testing in LRRs W, X, and Y. In closed depressions subject to ponding, 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings in a layer that is 5 cm (2 inches) or more thick and is entirely within the upper 15 cm (6 inches) of the soil.

JUNE

May

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24/31	25	26	27	28	29	30

July

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Piedmont Flood Plain Soils Indicator

Piedmont Flood Plain Soils Indicator is used on active flood plains throughout the Mid Atlantic Piedmont and Coastal Plain.

F19. Piedmont Flood Plain Soils

For use in MLRAs 149A and 148 of LRR S; for testing on flood plains subject to Piedmont deposition throughout LRRs P, S, and T. On active flood plains, a mineral layer at least 15 cm (6 inches) thick starting within 25 cm (10 inches) of the soil surface with a matrix (60 percent or more of the volume) chroma of less than 4 and 20 percent or more distinct or prominent concentrations occurring as soft masses or pore linings.

JULY

June

S	M	T	W	T	F	S
		1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

August

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			1	2	3	4 Independence Day
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Anomalous Bright Loamy Soils Indicator

Anomalous Bright Loamy Soils are found in the Mid-Atlantic coastal plain and can only be used within 100 m (656 feet) of estuarine marsh and within 1 m (3.28 feet) of mean high water.

F20. Anomalous Bright Loamy Soils
For use in MLRA 149A of LRR S and MLRAs 153C and 153D of LRR T; for testing in MLRA 153B of LRR T. Within 200 m (656 feet) of estuarine marshes or waters and within 1 m (3.28 feet) of mean high water, a mineral layer at least 10 cm (4 inches) thick starting within 20 cm (8 inches) of the soil surface with a matrix (60 percent or more of the volume) chroma of less than 5 and 10 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings and/or depletions.

AUGUST

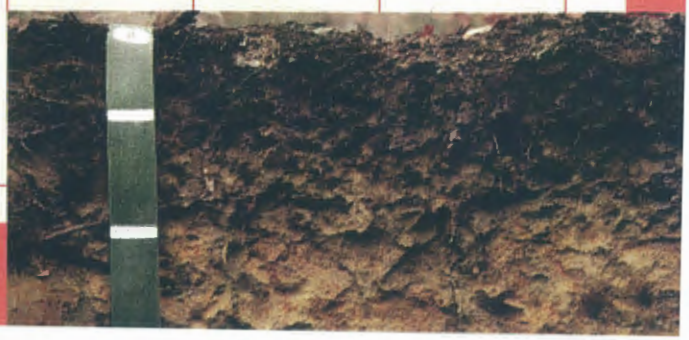
July

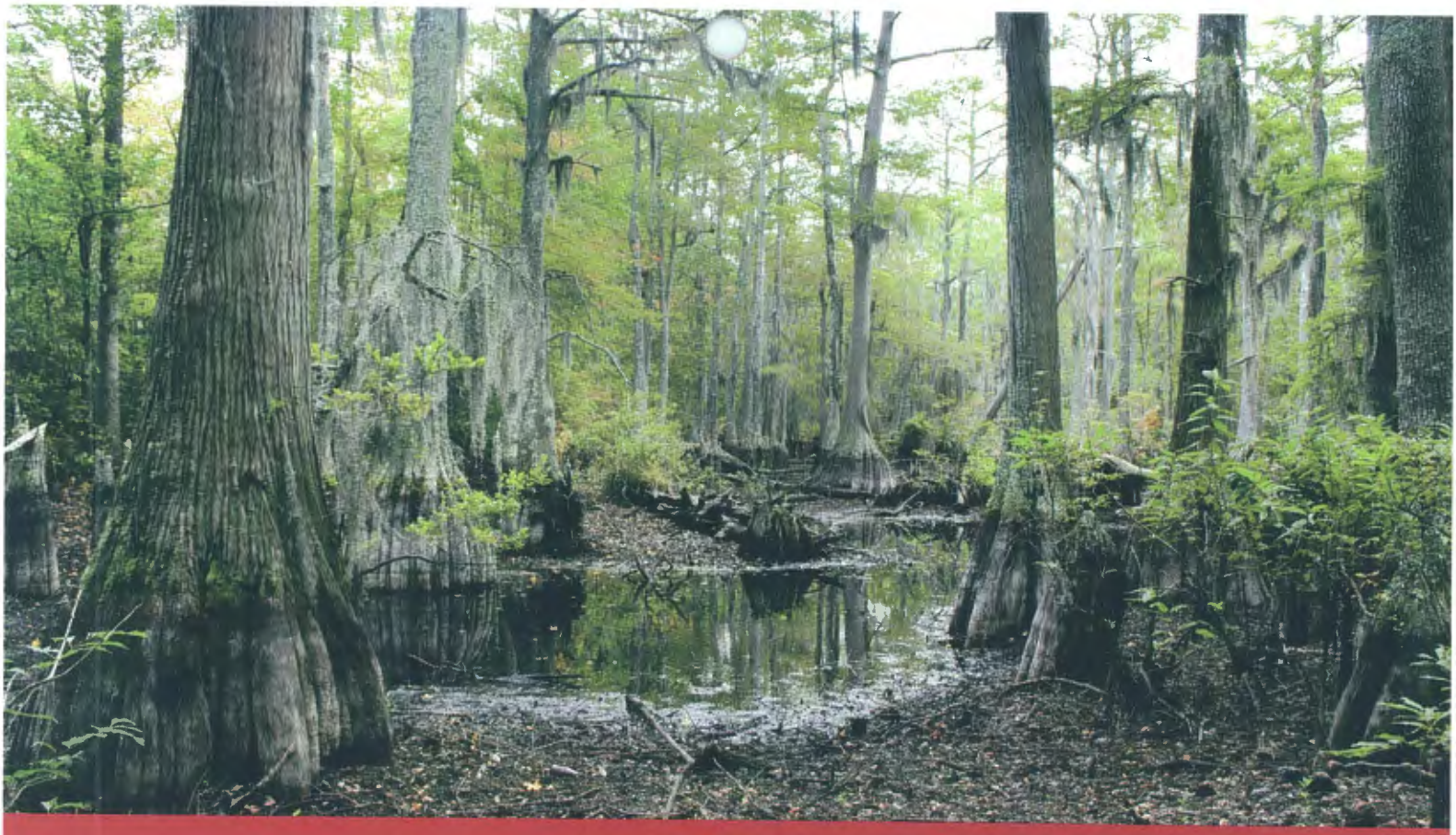
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

September

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23/30	24/31	25	26	27	28	29





Histosol or Histels Indicator

Histosol or Histels can be used throughout the U.S., though these soils are typically found in the wettest part of a wetland and are thus rarely used to delineate wetland boundaries.

A1. Histosol or Histels
For use in all LRRs. Classifies as a Histosol except Folist or as a Histel except Folistel.

Histosols and histels are types of soils composed primarily of organic matter and developed due to saturated conditions.

SEPTEMBER

August

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23/30	24/31	25	26	27	28	29

October

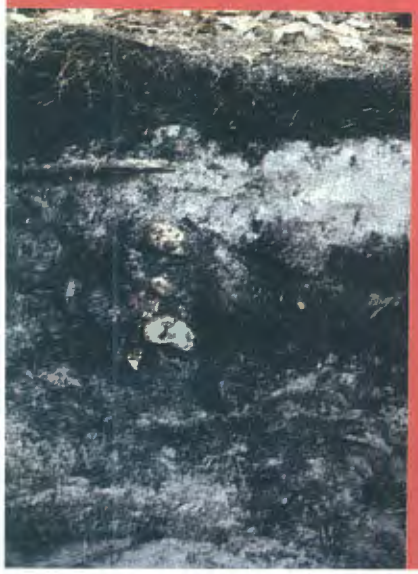
S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1	2	3	4	5
6	7 Labor Day	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

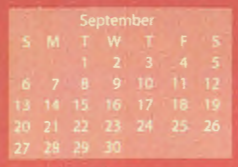
Stratified Layers Indicator

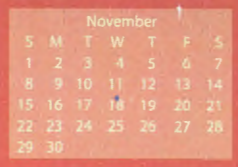
Stratified Layers Indicator can be used in the Eastern half and the Southwestern coast of the continental U.S.

A5. Stratified Layers
For use in LRRs C, F, K, L, M, N, O, P, R, S, T, and U; for testing in LRRs V and Z. Several stratified layers starting within the upper 15 cm (6 inches) of the soil surface. One or more of the layers has a value of 3 or less with chroma of 1 or less, and/or it is muck, mucky peat, or peat, or has a mucky modified mineral texture. The remaining layers have chroma of 2 or less.



OCTOBER





SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
				1	2	3
4	5	6	7	8	9	10
11	12 Columbus Day	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Thick Dark Surface Indicator

Thick Dark Surface can be used anywhere in the U.S., but is most often used in wet mollisols in the Midwest (prairie soils with thick, dark surfaces).

A12. Thick Dark Surface
For use in all LRRs. A layer at least 15 cm (6 inches) thick with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less and starting 30 cm (12 inches) below the surface. The layer(s) above the depleted or gleyed matrix must have value of 2.5 or less and chroma of 1 or less to a depth of at least 30 cm (12 inches) and value of 3 or less and chroma of 1 or less in any remaining layers above the depleted or gleyed matrix. Any sandy material above the depleted or gleyed matrix must have at least 70 percent of the visible soil particles covered, coated, or similarly masked with organic material.

NOVEMBER

October

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				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
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December

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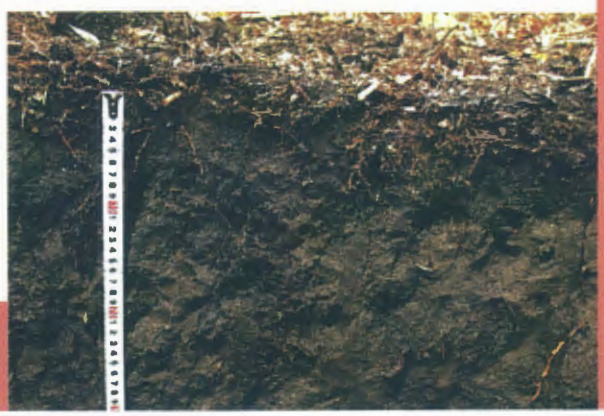
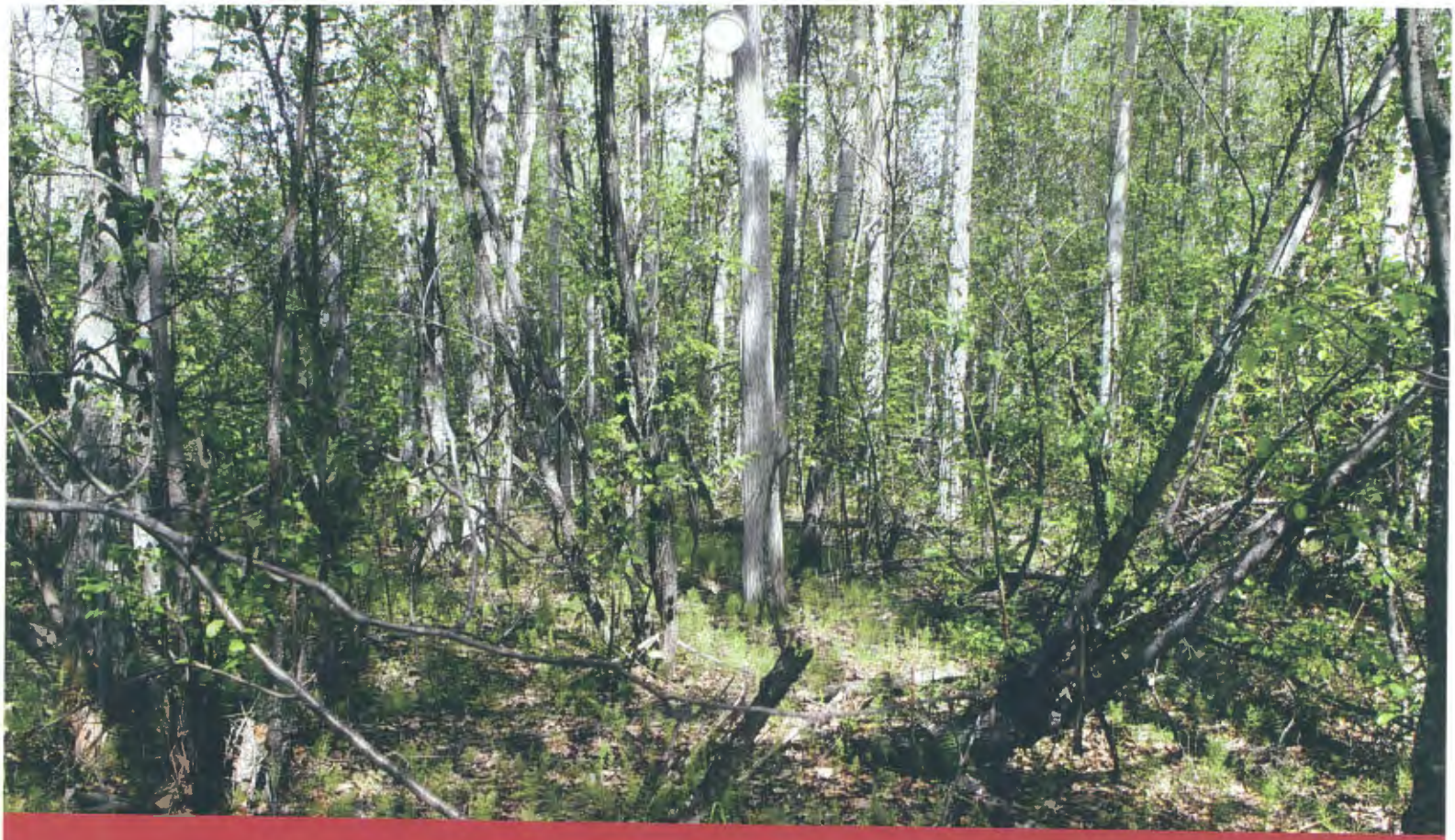
20	21	22	23	24	25	26
27	28	29	30	31		

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2	3	4	5	6	7
8	9	10	11 Veterans Day	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26 Thanksgiving Day	27	28
29	30					





Alaska Gleyed Pores Indicator

Alaska Gleyed Pores is an indicator used throughout Alaska.

A15. Alaska Gleyed Pores
For use in LRRs W, X, and Y. A mineral layer that has 10 percent or more hue of N, 10Y, 5GY, 10GY, 5G, 10G, 5BG, 10BG, 5B, 10B, or 5PB with value of 4 or more along root channels or other pores and that starts within 30 cm (12 inches) of the soil surface. The matrix has a dominant hue of 5Y or redder.

DECEMBER

November

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January

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
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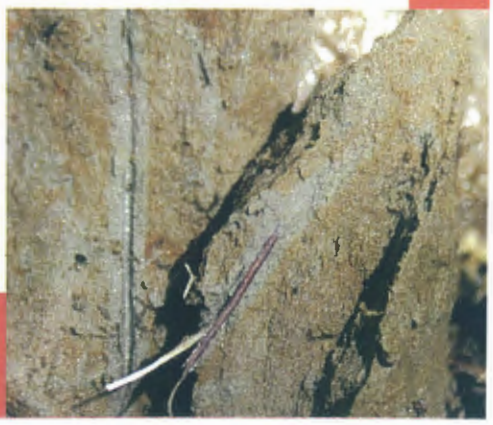
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25 Christmas Day	26
27	28	29	30	31		



Events 2009

January
International Year of Planet Earth 2007-2009

January 28-31, Cattle Industry Annual Convention & National Cattlemen's Beef Association Trade Show, Phoenix, AZ

February
February 1-4, National Association of Conservation Districts (NACD) Annual Meeting, New Orleans, LA

February 2, World Wetlands Day

March
March 17-19, 22nd Biennial Workshop on Aerial Photography, Videography, and High Resolution Digital Imagery for Resource Assessment, Lubbock, TX

March 24-26, 6th International Integrated Pest Management Symposium: "Transcending Boundaries," Portland, OR; www.ipmcenters.org/ipmsymposium09

April
April 22, Earth Day

April 25-29, American Planning Association, 100th National Planning Conference Planning Expo, Minneapolis, MN

May
May 4-15, 17th Session of the United Nations Commission for Sustainable Development, New York, NY

May 9-16, National Cooperative Soil Survey Conference, Las Cruces, NM

May 22, International Day for Biological Diversity

May 24-27, American Geophysical Union (AGU) Joint Assembly, Toronto, Canada

June
June 14-19, XVI International Nitrogen Fixation Congress, Big Sky, MT; john.peters@chemistry.montana.edu

June 14-20, 14th International Clay Conference, Castellaneta M., Italy; www.14icc.org

June 22-26, Society of Wetland Scientists (SWS) 30th Annual Meeting, Madison, WI

June 22-26, 10th International Meeting on Soils with Mediterranean Type of Climate, Beirut, Lebanon

July
July 11-16, Annual Meeting of the Society for Conservation Biology, Institute of Zoology, Chinese Academy of Sciences, Beijing, China

July 11-15, Soil and Water Conservation Society (SWCS) Annual Conference, Dearborn, MI

July 20-24, 11th International Symposium on Soil and Plant Analysis, Santa Rosa, CA; www.spcouncil.com

August
August 2-7, 94th Ecological Society of America (ESA) Annual Meeting, Albuquerque, NM

September
September 21-24, 2nd International Conference Biohydrology: "A Changing Climate for Biology and Soil Hydrology Interactions," Bratislava, Slovakia

September 20-23, International Union of Soil Science (IUSS) Salinization Conference, Budapest, Hungary

September 28-October 2, International Conference of the Working Group "Soils of Urban, Industrial, Traffic and Mining Areas" (SUITMA) of the International Union of Soil Science (IUSS), Queens College, CUNY, Flushing, NY

October
October 18-21, Geological Society of America Annual Meeting, Portland, OR

October 25-30, 9th International Congress on Plant Molecular Biology (IPMB), St. Louis, MO; www.ipmb2009.org or ipmb2009@missouri.edu

November
November 1-5, ASA–CSSA–SSSA International Annual Meeting, Pittsburgh, PA

November 16-20, "Soil Geography: New Horizons," Huatulco Santa Cruz, Oaxaca, Mexico; soilgeography09@gmail.com

December
December 14-18, American Geophysical Union Fall Meeting, San Francisco, CA

Calendar 2010

January

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August

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October

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November

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December

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References

Field Indicators of Hydric Soils in the United States, Version 6.0. G.W. Hurt and L.M. Vasilas (eds.). United States Department of Agriculture, Natural Resources Conservation Service, 2006 USDA, NRCS, in cooperation with the National Technical Committee for Hydric Soils.

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Natural Resources Conservation Service

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SWS

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