Wetland Delineation Methodology & Technical Criteria

Travis Morse

Senior Regulatory Project Manager Colorado West Regulatory Branch October 12, 2016



US Army Corps of Engineers BUILDING STRONG_®



- Approaches (Off-site/On-site)
- Plot sizes and transects
- Clarifications to vegetation, soil, and hydrology data collection and analyses
- Overview of Atypical/Problematic Conditions



• Q & A



Offsite Methods





- Preliminary site assessment
- Proposal phase of project
- "Homework" prior to field work
- Information is available on hydrology, soils, and vegetation



Which Regional Supplement?



Table 2. Comparison of general landscape characteristics between the Arid West Region and the Western Mountains, Valleys, and Coast Region.

Landscape Characteristics	Arid West Regional Supplement	Western Mountains, Valleys, and Coast Regional Supplement
Climate	Generally hot and dry with a long summer dry season. Average annual precipitation mostly <15 in. (380 mm) except along the coast. Most precipitation falls as rain.	Cooler and more humid, with a shorter dry season. Average annual precipitation mostly >20 in. (500 mm). Except near the coast, much of the annual precipitation falls as snow, particularly at higher elevations.
Vegetation	Little or no forest cover at the same elevation as the site and, if present, usually dominated by pinyon pine (e.g., <i>P. monophylla or P. edulis</i>), junipers (Juniperus), cottonwoods (e.g., <i>Populus fremontii</i>), willows (Salix), or hardwoods (e.g., <i>Quercus, Platanus</i>). Landscape mostly dominated by grasses and shrubs (e.g., sagebrush [Artemisia], rabbitbrush [Chrysothamnus], bitterbrush [Purshia], and creosote bush [Larrea]). Halophytes (e.g., Allenrolfea, Salicornia, Distichlis) present in saline areas.	Forests at comparable elevations in the local area dominated by conifers (e.g., spruce (<i>Picea</i>), fir (<i>Abies</i>), hemlock (<i>Tsuga</i>), Douglas-fir (<i>Pseudotsuga</i>), coast redwood (Sequoia), or pine (<i>Pinus</i>) except pinyon) or by aspen (<i>Populus</i> tremuloides). In the Willamette Valley, Oregon ash (<i>Fraxinus latifolia</i>) and bigleaf maple (<i>Acer macrophyllum</i>) often dominate. Open areas generally dominated by grasses, sedges, shrubs (e.g., willows or alders [<i>Alnus</i>]), or alpine tundra.
Soils	Mostly dry, poorly developed, low in organic matter content, and high in carbonates. Soils sometimes highly alkaline. Surface salt crusts and efflorescences common in low areas.	Generally better developed, higher in organic matter content, and low in carbonates. Surface salt features are less common except in geothermal areas.
Hydrology	Drainage basins often lacking outlets. Temporary ponds (often saline), salt lakes, and ephemeral streams predominate. Water tables often perched. Major streams and rivers flow through but have headwaters outside the Arid West.	Streams and rivers often perennial. Open drainages with many natural, freshwater lakes. Water tables often continuous with deeper groundwater. Region serves as the headwaters of the major streams and rivers of the western United States.



Land Cover

- The first step is to stratify the site so that the major vegetative communities can be evaluated separately.
- This may be done in advance using an aerial photograph or topographic map, or by walking the site.







Hydric Rating By Map Unit

- Set Area Of Interest
- **Click Soil Data Explorer**
- **Click Land** Classifications
- Click Hydric Rating By Map Unit
- **Click View Rating**



Hydric Rating By Map Unit



U.S.ARMY

Example Site



https://www.fws.gov/wetlands/Data/Mapper.html

U.S.ARN

Sample Points should be recorded in areas where topo map, NWI map, and/or aerial photograph <u>indicate</u> wetlands may be present EVEN if they are NOT PRESENT on the ground.





If data confirm wetland presence, upland sample points would also be needed to complete the paired-sample point requirement.



BUILDING STRONG_®

Off-Site Method

- Does not replace on-site methods
- Not a delineation
- Delineation reconnaissance

U.S. Fish & Wildlife Service

- Accuracy depends on:
 - Quality of data
 - User ability and experience to interpret data

United States Department of Agriculture Natural Resources Conservation Service

National Wetlands Inventory





On-site Method

'87 Manual – Routine and Comprehensive

Random sampling is sufficient for small, simple and noncontroversial projects (usually <5 ac) where communities are homogenous, boundaries are abrupt, project is not controversial

For large, complex, or controversial projects

- Establish baseline, position and number of transects
 - <1 mi = 3 transects;</p>
 - 1-2 mi = 3-5 transects;
 - 2-4 mi = 5-8 transects;
 - >4mi = 8 or more transects.
- Intervals between transects should not exceed 0.5 mile







Alpha characters represent different plant communities. All transects start at the midpoint of a

baseline segment except the first, which was repositioned to include community type A

U.S.ARMY

Wetland Determination Form

Project/Site: Poverty Knob	City/County: Grand Lake/Grand	Sampling Date: 01AUG2016
Applicant/Owner: Green Acres	State: CO	Sampling Point: 1
Investigator(s): Travis Morse	Section, Township, Range: S9, T9N, R75W	
Landform (hillslope, terrace, etc.): floodplain	Local relief (concave_pohvex, yone): convex	Slope (%): 0-3
Subregion (LRR): E - Rocky Mountain Forests 🔰 Lat: 39	12345 Long: - 198.56789	Datum: NAD3
Soil Map Unit Name: Kawuneeche mucky peat, 0 104 % s	pe WWI classifica	tion: PEMA/PSSA
Are climatic / hydrologic conditions on the site typical for this time of y	ear? Yes 🛛 🗷 No 🗖 (If no, explain in Re	marks.)
Are Vegetation, Soil, or Hydrology significantly	y disturbed? Are "Normal Circumstances" pr	esent? Yes 🗵 No 🔲
Are Vegetation, Soil, or Hydrology naturally p	roblematic? (If needed, explain any answers	s in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present?	Yes X No Yes No Yes No	Is the Sampled Area within a Wetland? Yes No
Remarks:		





Data Point Reminders

Complete a sufficient number of data points in appropriate locations to support your conclusions ...

...and to confirm or refute the information on natural resource maps.

This is especially important when NWI maps show wetland features, NRCS maps depict hydric soils, aerial photographs indicate wet signatures, or quad maps show wetlands or other water features that are not actually present on the site.



Sample Plots

- Plot sizes vary
- es vary
- Sample single community type only
- '87 Manual:
 - ► Tree Stratum 30-foot radius
 - Sapling/shrub stratum 5-ft radius
 - ► Herb stratum 5-ft radius
- U.S.ARMY
- ► Woody vines 30-ft radius







Selection of Dominant Species – 50/20 Rule

Hoch Stratum (Plateine: 5'r)			
Herb Stratum (Flot size)			
1. Phragmites australis - Common Reed	25	Y	FACW
Bromus inermis - Smooth Brome	25	Y	FACU
 Sporobolus airoides - Alkali Sacaton 	5		FAC
4.			
5.			
6.			
7.			
8			
(55	= Total Co	over
50% of total cover 27.5 20% of tot	al cover <u>1</u>	1	
		BUILD	ING STRON

Rapid Test

- All dominant species across all strata are rated OBL and/or FACW
- If so, minimal sampling required.
- Intended for obvious vegetation cases, e.g., cattail marsh



OBL

OBL

OBL

Herb Stratum (Plot size: 5' radius

1.Typha angustifolia (Narrow-Leaf Cat-Tail55Y2.Beckmannia syzigachne (American Slough Grass)10N3.Carex atherodes (Wheat Sedge)5N







Dominance Test

- More than 50 percent of dominant plant species across all strata are rated OBL, FACW, or FAC
- 50/20 Rule

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:

Total Number of Dominant Species Across All Strata:

Percent of Dominant Species That Are OBL, FACW, or FAC:



3

75



(A/B)



(A)

Determining Dominance: Ties in Percent Cover

Herb Stratum (Plot size: 5' r)			
Luzula parviflora (small-flower wood-rush)	10	Y	FAC
2. Oxypolis fendleri (Fendler's cowbane)	8	Y	FACW
3. Juncus dudleyi (Dudley's rush)	8	Y	FAC
4 Saxifraga chrysantha (golden saxigrage)	8	Y	FACU
5. Senecio triangularis (arrow-leaf ragwort)	5	Ν	FACW
6. Carex aquatilis (leafy tussock sedge)	1	Ν	OBL
	40	= Total Co	ver
50% of total cover 20 20%	of tota	l cover 8	3

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.











Hydrophytic Vegetation Determination:



Prevalence Index

Prevalence Index worksheet:

Total % Cor	M	-		
OBL species		x 1 =		
FACW species	50	x 2 =	100	
FAC species	5	x 3 = .	15	
FACU species	35	x 4 =	140	
UPL species	6	x 5 =	30	
Column Totals:	96	(A)	285	(B)

Prevalence Index = B/A = 2.97





Project/Site: Poverty Knob		City/County	Grand L	.ake/Grand	Sampling Date: 01AUG2016		
Applicant/Owner: Green Acres				State: CO	Sampling Point: 1		
Investigator(c): Travis Morse			workin Pa		camping rom.		
Landform (hillslong, terrage, etc.); floodplain		Jection, To	witiship, rta	convex	Steen (%) 1 0-3		
Cuberciae (LDD), E - Rocky Mountain Forests	39	12345	r (concave,	-108 56789			
Subregion (LRR): - result international of the	4 % slot	ne		Long: 100.00100	Datum: N. LOC		
Soli Map Onit Name: real and control in a control of the					sation: <u></u>		
Are climatic / hydrologic conditions on the site typical for this	s time of ye	ear? Yes	NO_	(If no, explain in H	(emarks.)		
Are Vegetation, Soil, or Hydrologys	ignificantly	disturbed?	Are	"Normal Circumstances" p	present? Yes 🛄 No 🛄		
Are Vegetation, Soil, or Hydrology n	Are Vegetation, Soil, or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)						
SUMMARY OF FINDINGS – Attach site map	showing	g samplin	g point i	ocations, transects	, important features, etc.		
Hydrophytic Vegetation Present? Yes 💌 N	°	ls th	e Sampleo	d Area			
Wetland Hydrology Present? Yes N	° – H	with	in a Wetla	nd? Yes	× No		
Remarks:							
VEGETATION – Use scientific names of plan	ts.						
Tora Shahara (Shahajara	Absolute	Dominant	Indicator	Dominance Test work	isheet:		
Iree Stratum (Plot size:)	% Cover	Species?	Status	Number of Dominant S	pecies (A)		
2				That Are OBL, PAGW,	01 PAC (A)		
3.				Total Number of Domin Species Across All Stra	ant (B)		
4				Demost of Demission (D			
5'r		= Total Co	ver	That Are OBL, FACW,	AFAC: 75 (A/B)		
Sapling/Shrub Stratum (Plot size: 2)	5	v	FACU	Prevalence Index wor	k ret:		
 Salix geveriana (Gever's willow) 	2	Y	FACW	Total % Cover of:	A Ningly by:		
2	-	-		OBL species	x1=		
4				FACW species 72	x 2 = 144		
5.				FAC species 30	x3 = 90		
5'r	7	= Total Co	ver	FACU species	x4 = 20		
Herb Stratum (Plot size: 2) Agrostis gigantea (black bent)	25	Y	FAC	Column Totals: 109	(A) 262 (B)		
 Givceria elata (tall manna grass) 	70	Y	FACW		24		
2 Conium maculatum (poison-hemlock)	5	Ň	FAC	Prevalence Index	a = B/A = <u>2.4</u>		
Galium aparine (sticky-willy)	2	N	FACU	1 Papid Test for	udrophytic Vegetation		
5.				2 - Dominance Tes	t is >50%		
6.				3 - Prevalence Ind	ex is <3.01		
7.				4 - Morphological /	Adaptations ¹ (Provide supporting		
8.				data in Remark	s or on a separate sheet)		
9				5 - Wetland Non-V	ascular Plants ¹		
10				Problematic Hydro	phytic Vegetation ¹ (Explain)		
11	407			¹ Indicators of hydric so be present unless dist	il and wetland hydrology must urbed or problematic		
Woody Vine Stratum (Plot size:	107	= Total Co	ver	be present, unless dist			
1.				Hudrophytic	7		
2.				Vegetation 2	_ 3 _		
	114	= Total Co	ver	Present? Ye	s 🔟 🎦 🛄		
% Bare Ground in Herb Stratum U%					AAAN		
Remarks:							

Prevalence Index should not be used when the Rapid Test or Dominance Test is already met.





Procedure for sampling soils

- Dig a hole and describe the soil profile
- Approximately 20 inches from the soil surface
- Examination to 40 inches or more may be needed to determine whether they meet the requirements of indicator A12 (Thick Dark Surface)





Describe the Soil Profile

To select the appropriate indicator(s), it is critical to accurately describe the soil profile <u>on the data sheet.</u>

The soil profile is layered.

Each layer...

...has a thickness (depth), ...has a color, ...has a texture, and

...may have other features.







Describe the Soil Profile

SOIL				Sampling Point:
Profile Description: (Describe to the dept	h needed to document the in	ndicator or confirm	the absence	of indicators.)
Depth Matrix	Redox Features			
(inches) Color (moist) %	Color (moist) %	Type' Loc ²	Texture	Remarks
<u>0-7 10 YR 3/1 100</u>			Sandy	
7-20 10 YR 3/2 100			Sandy	
¹ Type: C=Concentration, D=Depletion, RM=	Reduced Matrix, MS=Masked	Sand Grains.	² Location:	PL=Pore Lining, M=Matrix.



U.S.ARMY



Redox Features Within a Soil Matrix





Concentrations -- Depletions





Describe the Soil Profile

SOIL Sampling Point						
Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)						
Depth (inches) Matrix Color (moist) Redox Features Color (moist) Type ¹ Loc ² Texture Remarks 0-7 10 YR 3/2 100						
7-20 10 YR 5/1 90 10 YR 6/8 10 C M Sandy prominent redox						
¹ Tune: C=Conceptration D=Depletion RM=Reduced Metrix MS=Mesked Send Crains ² Location: DL=Dore Liping M=Metrix						

- Record: Layer Depth and Thickness (to at least to 20" depth)
- Record: Matrix Color and Percent
- Record: Redox Color and Percent
- □ Record: Redox Feature Type
- Record: Redox Feature Location





Redox Colors: Concentrations vs. Depletions

SOIL	Sampling Point:	_
Profile Description: (Describe to the depth needed to document the indicator or confirm	m the absence of indicators.)	
Depth Matrix Redox Features (inches) Color (moist) % Color (moist) 0-7 10 YR 3/2 100	Texture Remarks	
To TR 0/2 100 10 YR 7/1 10 C M 7-20 10 YR 5/1 90 10 YR 7/1 10 C M 'Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. 10 YR 7/1 is a color in the depleted range	MUNSELL SOIL COLU CHARI 10YR Indicates ack of 7/1 Mn/Fe oxides Indicates presence of Fe oxides	
a depletion cannot be a concentration.		
		RAD

U.S.ARMY

Indicators are Arranged Based on Texture



A Indicators = All Soils S Indicators = Sandy Soils F Indicators = Fine Soils (Loamy/Clayey Textures)





Soil Texture Triangle



Texture is determined using the "rub test"





Describe the Soil Profile

SOIL					Sampling Point:
Profile Description: (Describe to the dep DepthMatrix	th needed to docum Redox	ent the indic	ator or confirm	the absence	of indicators.)
0-7 10 YR 3/2 100	Color (moist)		<u>/pe'Loc'</u>	Muck	Hemarks
7-20 10 YR 5/1 90	10 YR 6/8	10 C	M	L/C	Prominent redox
¹ Type: C=Concentration, D=Depletion, RM	Reduced Matrix, MS	=Masked Sar	nd Grains.	² Location:	PL=Pore Lining, M=Matrix.

- Record: Layer Depth and Thickness (to at least to 20" depth)
- Record: Matrix Color and Percent
- Record: Redox Color and Percent
- Record: Redox Feature Type
- Record: Redox Feature Location
- **Record: Texture**



Record: Additional Supporting Information as Applicable



Contrast of Features

- The degree of visual distinction between associated colors
 - Faint evident only on close examination
 - Distinct readily seen
 - Prominent contrast strongly

See Table A1 in Arid West Supplement

н	ues are the sam	e (∆ h = 0)		Hues differ by 2	(Δ h = 2)
∆ Value	∆ Chroma	Contrast	∆ Value	∆ Chroma	Contrast
0	≤1	Faint	0	0	Faint
0	2	Distinct	0	1	Distinct
0	3	Distinct	0	≥2	Prominent
0	≥4	Prominent	1	≤1	Distinct
1	≤1	Faint	1	≥2	Prominent
1	2	Distinct	≥2	-	Prominent

Table A1. Tabular key for contrast determinations using Munsell notation.





BUILDING STRONG_®

Growing Season

- Based on biological activity in a given year, as indicated by:
 - Emergence, green-up, growth, bud burst, or flowering of non-evergreen vascular plants, or
 - Soil temperature at the 12 inch depth is 41 F (5 C) or higher





Correct Indicator?

Wetland Hydrology Indicators:		
Primary Indicators (minimum of one required; ch	eck all that apply)	Secondary Indicators (2 or more required)
Surface Water (A1)	Salt Crust (B11)	Water Marks (B1) (Riverine)
 High Water Table (A2) 	Biotic Crust (B12)	Sediment Deposits (B2) (Riverine)
✓ Saturation (A3)	Aquatic Invertebrates (B13)	Drift Deposits (B3) (Riverine)
Water Marks (B1) (Nonriverine)	Hydrogen Sulfide Odor (C1)	Drainage Patterns (B10)
Sediment Deposits (B2) (Nonriverine)	Oxidized Rhizospheres along Living Roots	(C3) Dry-Season Water Table (C2)
Drift Deposits (B3) (Nonriverine)	Presence of Reduced Iron (C4)	Crayfish Burrows (C8)
Surface Soil Cracks (B6)	Recent Iron Reduction in Tilled Soils (C6)	Saturation Visible on Aerial Imagery (C9)
Inundation Visible on Aerial Imagery (B7)	Thin Muck Surface (C7)	Shallow Aquitard (D3)
Water-Stained Leaves (B9)	Other (Explain in Remarks)	FAC-Neutral Test (D5)
Field Observations:		
Surface Water Present? Yes No	✓ Depth (inches):	
Water Table Present? Yes 🖌 No	Depth (inches): 10	
Saturation Present? Yes 🖌 No (includes capillary fringe)	Depth (inches): 4 Wetland	l Hydrology Present? Yes <mark>✓</mark> No

- ► A2 direct, visual observation of the water table ≤12" below the surface
- ► A3 observation of saturated soil conditions ≤12" from the soil surface





C2: Dry Season Water Table

- Visual observation of the water table between 12 and 24 inches below the surface during the normal dry season or during a drier than normal year.
 - **User Notes:** Due to normal seasonal fluctuations, water tables in wetlands often drop below 12 inches during the summer dry season.

A water table between 12 and 24 inches during the dry season, or during an unusually dry year, indicates a normal wet season water table within 12 inches of the surface.





D2: Geomorphic Position

- This indicator is present if the area in question is located in a depression, drainageway, concave position within a floodplain, at the toe of a slope, on an extensive flat, on the low elevation fringe of a pond or other water body, or in an area where groundwater discharges.
- User Notes: Excess water from precipitation naturally accumulates in certain geomorphic positions in the landscape. In regions with abundant rainfall, these geomorphic positions often exhibit wetland hydrology.





Indicator D2: Geomorphic position

HYDROLOGY

Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)
Surface Water (A1)	Sparsely Vegetated Concave Surface (B8) Drainage Pattems (B10) Moss Trim Lines (B16) Dry-Season Water Table (C2) Crayfish Burrows (C8) Suturation Visible on Aerial Imagery (C9) Sturted or Stressed Plants (D1) Geomorphic Position (D2) Shallow Aquitard (D3) Microtopographic Relief (D4)
Aquatic Fauna (B13) Field Observations: Surface Water Present? Yes No X Depth (inches): Water Table Present? Yes No X Depth (inches): Saturation Present? Yes No X Depth (inches): Wetland (includes capillary fringe) Description Present Data (stream cause menitoring well, actial photos, provider inspections), if av	FAC-Neutral Test (D5) Hydrology Present? Yes X No
Remarks:	anabre.
All Group D indicators are <u>secondary cate</u>	egory, and therefore



D5: FAC-Neutral Test

Step 1: Use the 50/20 Rule to select dominant species from each stratum of the community.

Step 2: Combine dominant species from all strata into a single list. Determine the wetland indicator status for each dominant species. For example:

Dominant Species	Stratum	Indicator Status		
Abies bifolia	Tree	FACU		
Populus an <mark>gus</mark> tifolia	Tree	FACW		
Prunus virginiana	Sapling	FACU		
Alnus incana	Sapling	FACW		
Lonicera involucrata	Shrub	FAC		
Salix ligulifolia	Shrub	FAC		
Saxifraga rivularis	Herb	FACW		
Carex pellita	Herb	OBL		
Arctium minus	Herb	UPL		

Step 3: Drop the FAC species and sort the remaining species into two groups: FACW and OBL species, and FACU and UPL species:

FACW and OBL Species	FACU and UPL Species
Populus angustifolia	Abies bifolia
Alnus incana	Prunus virginiana
Saxifraga rivularis	Arctium minus
Carex pellita	

Step 4: Count the number of species in each group. If the number of dominant species that are FACW and OBL is greater than the number of dominant species that are FACU and UPL, then the site passes the FAC-neutral test. In the example, four species are FACW and/or OBL, and three species are FACU or UPL. Therefore, the site passes the FAC-neutral test.





BUILDING STRONG_®

Example Data Sheet Inaccuracy

HYDROLOGY



BUILDING STRONG_®

Atypical Areas

(Part IV, Section F of USACE 1987 Delineation Manual)

Human Activities

- Removal of vegetation
- Removal of soil
- Placement of fill
- Construction of dams and levees
- Conversion to agriculture
- Channelization
- Drainage

Natural Events

- Change in river course
- Beaver dams
- Avalanches and mudslides
- ► Fires
- Volcanic deposition







Problematic Conditions

Difficult Wetland Situations in the Arid West

(Chapter 5, Sept 2008 Regional Supplement to USACE 1987 Delineation Manual)

- Lacking one factor:
 - Problematic Hydrophytic Vegetation (grazing, managed plant communities, riparian areas, sparse and patchy vegetation, etc.)
 - Problematic Hydric Soils
 - Wetlands that Periodically Lack Indicators of Wetland Hydrology
- Disturbance, normal seasonal or annual variability, or permanent changes
- Essentially, lacking one of the three criteria does not exclude the Aquatic Resource from being a wetland





Problem Areas

- Wetland in which indicators of one or more parameter may periodically be lacking due to normal seasonal or annual variability
 - Moderately to very strongly alkaline soils
 - Vegetated sand and gravel bars within floodplains
 - Seasonally ponded areas
 - Drought
 - Recently developed wetlands







Methodology

- Verify that one or more parameter of a wetland are present and that one or more parameters is problematic or has been altered.
- Verify that at least one wetland parameter is satisfied or that wetland indicators are absent due to disturbance or other factors.
 - If no wetland indicators are present, then the area is probably non-wetland and no further analysis is required.





Continued...

Weather and Site Condition Considerations:

- What time of year are you visiting the site?
- Consider recent rain events. Did it rain immediately before your site visit and how much has it rained?
- Has long-term precipitation been normal?
- Is the site irrigated?





Hydrology and Climate Data

NRCS Tools - WETS Table http://www.wcc.nrcs.usda.gov/climate/wetlands.html

Problematic Vegetation https://efotg.sc.egov.usda.gov/references/public/CO/CO-CPS-33_ProblematicVeg.xlsx

Remote Sensing

https://efotg.sc.egov.usda.gov/references/public/CO/CO-CPA-32_RemoteSensing.xlsx

http://www.drought.gov/drought/area/co

USGS Real-Time Water Data http://water.usgs.gov/realtime.html

USGS National Hydrography Dataset http://nhd.usgs.gov/



U.S. Drought Monitor Colorado

Vational Integrated Drought Information System

U.S. Drought P

March 22, 2016 (Released Thursday, Mar. 24, 2016)						
Drought Conditions (Percent Area)						
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	68.75	31.25	2.95	0.00	0.00	0.00
Last Week 3/15/2016	72.25	27.75	0.03	0.00	0.00	0.00
3 Month s Ago 12/22/2015	88.11	11.89	0.00	0.00	0.00	0.00
Start of Calend ar Year 1229.2015	90.02	9.98	0.00	0.00	0.00	0.00
Start of Water Year 3/29/2015	71.49	28.51	0.00	0.00	0.00	0.00
One Year Ago 3/24/2015	32.22	67.78	51.62	21.71	0.00	0.00
Intensity_ D0 Abnom ally Dry D1 Moderate Drought D2 Severe Drought D2 Severe Drought D2 Severe Drought						
Local conditions may vary. See accompanying text summary for forecast statements.						
Author: Brad Rippey U.S. Department of Agriculture						
USDA		q	P			(111)

tp://droughtmonitor.unl.ed







