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Department of  
Agriculture



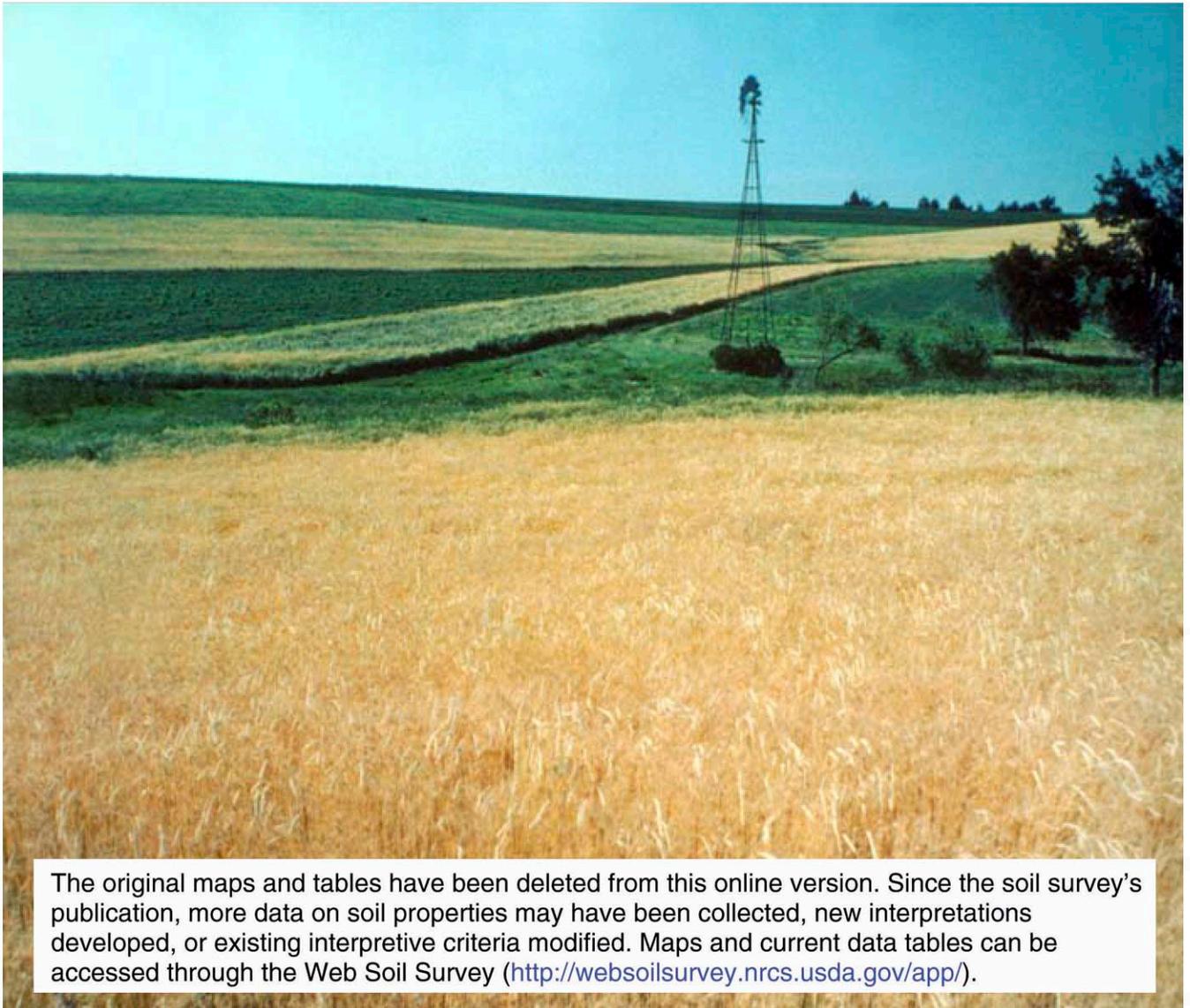
Natural  
Resources  
Conservation  
Service



In cooperation with the  
United States Department  
of the Interior, Bureau of  
Land Management, and  
Montana Agricultural  
Experiment Station

# MT025—Soil Survey of Fallon County, Montana

## Part I



The original maps and tables have been deleted from this online version. Since the soil survey's publication, more data on soil properties may have been collected, new interpretations developed, or existing interpretive criteria modified. Maps and current data tables can be accessed through the Web Soil Survey (<http://websoilsurvey.nrcs.usda.gov/app/>).



# How to Use This Soil Survey

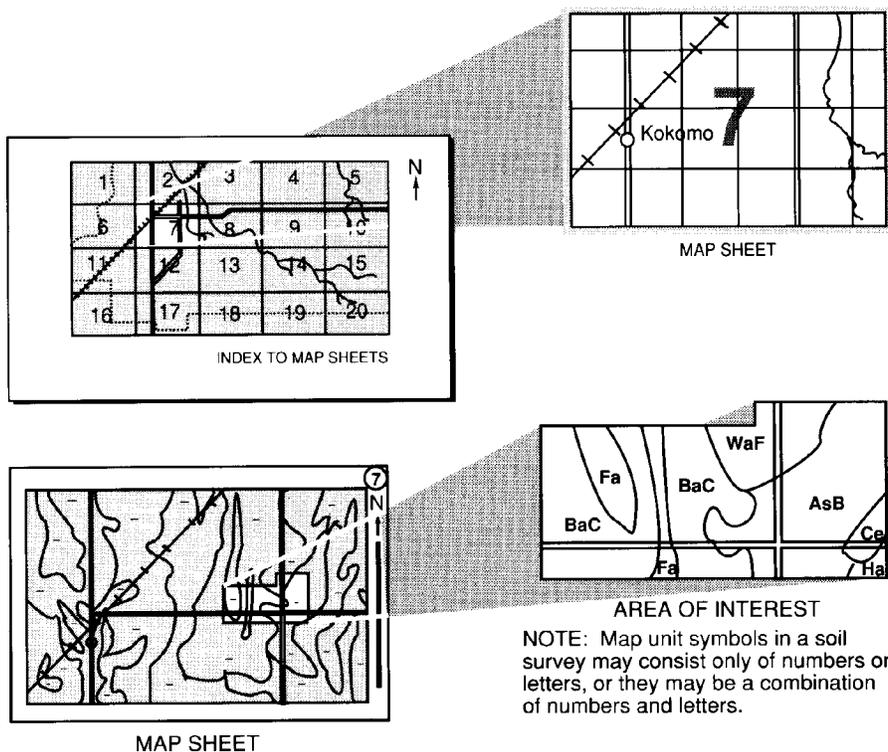
## Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, you can locate the Section, Township, and Range by zooming in on the **Index to Map Sheets**, or you can go to the Web Soil Survey at (<http://websoilsurvey.nrcs.usda.gov/app/>).

Note the map unit symbols that are in that area. The **Contents** lists the map units by symbol and name and shows the page where each map unit is described.

See the Contents for sections of this publication that may address your specific needs.



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This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1989. Soil names and descriptions were approved in 1991. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1990. This survey was made cooperatively by the Natural Resources Conservation Service; U.S. Department of Interior, Bureau of Land Management; and the Montana Agricultural Experiment Station. It is part of the technical assistance furnished to the Little Beaver Conservation District.

The most current official data are available through the NRCS Soil Data Mart website at <http://soildatamart.nrcs.usda.gov>. Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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**Cover: Soils in the foreground are Lonna silt loam. Soils in the background are a complex of Lonna and Cambeth silt loams. Windmills were commonly used in the sedimentary plains of eastern Montana to pump water from shallow aquifers for livestock use.**

*Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at <http://www.nrcs.usda.gov>.*

# Contents

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## Part I

<b>How To Use This Soil Survey</b> .....	i
<b>Index to Taxonomic Units</b> .....	ix
<b>Index to Map Units</b> .....	x
<b>Summary of Tables</b> .....	xiv
<b>Foreword</b> .....	xvii
General Nature of the Survey Area .....	1
History .....	1
Industry, Transportation, and Recreation .....	2
Physiography and Drainage .....	2
Geology .....	2
Mineral and Ground-Water Resources .....	3
Climate .....	4
How This Survey Was Made .....	4
<b>Formation and Classification of the Soils</b> .....	9
Formation of the Soils .....	9
Classification of the Soils .....	10
<b>Soil Series and Detailed Soil Map Units</b> .....	17
<i>Abor Series</i> .....	18
51C—Abor silty clay loam, 2 to 8 percent slopes .....	19
251D—Abor-Yawdim silty clay loams, 4 to 15 percent slopes .....	19
<i>Absher Series</i> .....	20
168B—Absher-Gerdrum complex, 0 to 4 percent slopes .....	21
<i>Adger Series</i> .....	21
<i>Alona Series</i> .....	23
20C—Alona silt loam, 2 to 8 percent slopes .....	24
<i>Archin Series</i> .....	24
75A—Archin-Absher complex, 0 to 2 percent slopes .....	25
75C—Archin-Absher complex, 2 to 8 percent slopes .....	26
175A—Archin loam, 0 to 2 percent slopes .....	26
175C—Archin loam, 2 to 8 percent slopes .....	27
275D—Archin, gullied-Delpoint complex, 4 to 15 percent slopes .....	27
375C—Archin-Ynot complex, 2 to 8 percent slopes .....	28
<i>Assinniboine Series</i> .....	28
74A—Assinniboine sandy clay loam, 0 to 2 percent slopes .....	29
74C—Assinniboine sandy clay loam, 2 to 8 percent slopes .....	29
174C—Assinniboine-Ynot complex, 2 to 8 percent slopes .....	30
13F—Badland .....	30
113F—Badland-Benz-Parchin complex, 0 to 70 percent slopes .....	30
<i>Barkof Series</i> .....	31
27C—Barkof clay, 2 to 8 percent slopes .....	32
<i>Bascovy Series</i> .....	32
90C—Bascovy clay, 2 to 8 percent slopes .....	33
<i>Benz Series</i> .....	33
11C—Benz clay loam, 2 to 8 percent slopes .....	34
<i>Blacksheep Series</i> .....	34
55D—Blacksheep-Twilight fine sandy loams, 8 to 15 percent slopes .....	35
55E—Blacksheep-Twilight fine sandy loams, 15 to 45 percent slopes .....	35
155E—Blacksheep-Rock outcrop complex, 25 to 50 percent .....	36
<i>Bonfri Series</i> .....	37
91C—Bonfri loam, 2 to 8 percent slopes .....	37
91D—Bonfri loam, 8 to 15 percent slopes .....	38
191C—Bonfri-Cambeth complex, 2 to 8 percent slopes .....	38
291D—Bonfri-Cabbart loams, 8 to 15 percent slopes .....	39
391C—Bonfri-Parchin complex, 2 to 8 percent slopes .....	39
<i>Bullock Series</i> .....	40
<i>Busby Series</i> .....	41
70C—Busby fine sandy loam, 2 to 8 percent slopes .....	41

70D—Busby fine sandy loam, 8 to 15 percent slopes .....	42	<i>Carfall Series</i> .....	55
170D—Busby-Blacksheep-Twilight fine sandy loams, 8 to 25 percent slopes .....	42	14C—Carfall loam, 2 to 8 percent slopes .....	55
170E—Busby-Blacksheep-Rock outcrop complex, 8 to 25 percent slopes .....	43	114C—Carfall-Assinniboine complex, 2 to 8 percent slopes .....	56
270E—Busby, gullied-Delpoint-Yawdim complex, 8 to 25 percent slopes .....	43	114D—Carfall-Assinniboine complex, 8 to 15 percent slopes .....	56
<i>Cabba Series</i> .....	44	<i>Chanta Series</i> .....	57
112D—Cabba-Cambert complex, 4 to 15 percent slopes .....	45	50A—Chanta loam, 0 to 2 percent slopes .....	58
312D—Cabba-Dast complex, 8 to 15 percent slopes .....	45	50C—Chanta loam, 2 to 8 percent slopes .....	58
412E—Cabba-Wayden complex, 8 to 45 percent slopes .....	46	<i>Chinook Series</i> .....	58
512E—Cabba-Dast complex, 15 to 25 percent slopes .....	46	83A—Chinook sandy loam, 0 to 2 percent slopes .....	60
<i>Cabbart Series</i> .....	47	83C—Chinook sandy loam, 2 to 8 percent slopes .....	60
60D—Cabbart silt loam, 4 to 15 percent slopes .....	48	83D—Chinook sandy loam, 8 to 15 percent slopes .....	60
160E—Cabbart-Rock outcrop-Delpoint complex, 15 to 50 percent slopes .....	48	183C—Chinook-Assinniboine complex, 2 to 8 percent slopes .....	61
160F—Cabbart-Rock outcrop-Yawdim complex, 15 to 70 percent slopes .....	49	283C—Chinook-Archin complex, 2 to 8 percent slopes .....	61
260D—Cabbart-Cambeth silt loams, 8 to 15 percent slopes .....	49	<i>Cohagen Series</i> .....	62
360D—Cabbart-Bascovy complex, 4 to 15 percent slopes .....	50	<i>Cooers Series</i> .....	62
<i>Cambert Series</i> .....	50	8E—Cooers-Kirby-Rock outcrop complex, 8 to 25 percent slopes .....	63
112C—Cambert-Cabba complex, 2 to 8 percent slopes .....	51	<i>Creed Series</i> .....	64
<i>Cambeth Series</i> .....	52	54A—Creed loam, 0 to 2 percent slopes .....	65
60C—Cambeth silt loam, 2 to 8 percent slopes .....	53	54C—Creed loam, 2 to 8 percent slopes .....	66
160D—Cambeth-Lonna silt loams, 8 to 15 percent slopes .....	53	154C—Creed-Absher complex, 2 to 8 percent slopes .....	66
260C—Cambeth-Cabbart silt loams, 2 to 8 percent slopes .....	54	254C—Creed-Gerdrum complex, 2 to 8 percent slopes .....	67
260E—Cambeth-Cabbart-Yawdim complex, 15 to 25 percent slopes .....	54	<i>Daglum Series</i> .....	67
		45A—Daglum loam, 0 to 2 percent slopes .....	68
		45C—Daglum loam, 2 to 8 percent slopes .....	69
		145A—Daglum-Adger complex, 0 to 2 percent slopes .....	69
		145C—Daglum-Adger complex, 2 to 8 percent slopes .....	69
		245A—Daglum loam, dry, 0 to 2 percent slopes .....	70

245C—Daglum loam, dry, 2 to 8 percent slopes .....	70	165C—Gerdrum-Absher complex, 2 to 8 percent slopes .....	86
<i>Dast Series</i> .....	71	<i>Glendive Series</i> .....	86
<i>Delpoint Series</i> .....	72	61A—Glendive sandy loam, 0 to 2 percent slopes .....	87
71C—Delpoint loam, 2 to 8 percent slopes .....	72	161B—Glendive sandy loam, saline, 0 to 4 percent slopes .....	87
171C—Delpoint-Cabbart complex, 2 to 8 percent slopes .....	73	<i>Grail Series</i> .....	88
171D—Delpoint-Cabbart complex, 8 to 15 percent slopes .....	73	43B—Grail silt loam, 0 to 4 percent slopes .....	88
271D—Delpoint-Yamacall loams, 8 to 15 percent slopes .....	74	<i>Hanly Series</i> .....	89
371E—Delpoint-Cooers-Kirby complex, 15 to 35 percent slopes .....	74	7B—Hanly-Ryell fine sandy loams, 0 to 4 percent slopes .....	89
<i>Eapa Series</i> .....	75	<i>Harlake Series</i> .....	90
84A—Eapa loam, 0 to 2 percent slopes .....	76	57A—Harlake silty clay, saline, 0 to 2 percent slopes .....	91
84C—Eapa loam, 2 to 8 percent slopes .....	76	157A—Harlake silty clay loam, 0 to 2 percent slopes .....	91
84D—Eapa loam, 8 to 15 percent slopes .....	77	<i>Havre Series</i> .....	91
167C—Eapa-Yamacall loams, 2 to 8 percent slopes .....	77	56A—Havre loam, 0 to 2 percent slopes .....	92
<i>Ethridge Series</i> .....	77	156A—Havre loam, saline, 0 to 2 percent slopes .....	93
85A—Ethridge silty clay loam, 0 to 2 percent slopes .....	79	256A—Havre-Harlake complex, 0 to 2 percent slopes .....	93
85C—Ethridge silty clay loam, 2 to 8 percent slopes .....	79	<i>Kirby Series</i> .....	93
166C—Ethridge loam, 2 to 8 percent slopes .....	79	176D—Kirby-Cabbart complex, 8 to 25 percent slopes .....	94
<i>Farnuf Series</i> .....	80	276F—Kirby-Blacksheep-Rock outcrop complex, 25 to 60 percent slopes .....	95
35A—Farnuf loam, 0 to 2 percent slopes .....	80	<i>Kobase Series</i> .....	95
35C—Farnuf loam, 2 to 8 percent slopes .....	81	78C—Kobase silty clay loam, 2 to 8 percent slopes .....	96
<i>Floweree Series</i> .....	81	<i>Kremlin Series</i> .....	97
82A—Floweree silt loam, 0 to 2 percent slopes .....	82	72A—Kremlin loam, 0 to 2 percent slopes .....	98
82C—Floweree silt loam, 2 to 8 percent slopes .....	83	72C—Kremlin loam, 2 to 8 percent slopes .....	98
<i>Gerdrum Series</i> .....	83	172C—Kremlin-Cabbart complex, 2 to 8 percent slopes .....	98
65A—Gerdrum clay loam, 0 to 2 percent slopes .....	84	<i>Lonna Series</i> .....	99
65C—Gerdrum clay loam, 2 to 8 percent slopes .....	85	93A—Lonna silt loam, 0 to 2 percent slopes .....	100
165A—Gerdrum-Absher complex, 0 to 2 percent slopes .....	85	93C—Lonna silt loam, 2 to 8 percent slopes ...	100

---

193C—Lonna-Cambeth silt loams, 2 to 8 percent slopes .....	101	48D—Prego sandy loam, 2 to 15 percent slopes .....	115
193D—Lonna-Cambeth-Cabbart silt loams, 4 to 12 percent slopes .....	101	<i>Reeder Series</i> .....	116
293C—Lonna-Cabbart silt loams, 2 to 8 percent slopes .....	102	42C—Reeder loam, 2 to 8 percent slopes .....	116
293D—Lonna-Cabbart silt loams, 8 to 25 percent slopes .....	103	142D—Reeder-Cabba loams, 4 to 15 percent slopes .....	117
393E—Lonna-Cambeth-Cabbart silt loams, 12 to 25 percent slopes .....	103	142E—Reeder-Cabba loams, 15 to 45 percent slopes .....	117
<i>Marmarth Series</i> .....	104	242D—Reeder-Dast complex, 4 to 15 percent slopes .....	118
81C—Marmarth loam, 2 to 8 percent slopes ...	105	<i>Regent Series</i> .....	118
<i>Marvan Series</i> .....	105	34C—Regent clay loam, 2 to 8 percent slopes .....	119
89A—Marvan silty clay, 0 to 2 percent slopes .....	106	<i>Ryell Series</i> .....	119
89C—Marvan silty clay, 2 to 8 percent slopes .....	106	<i>Savage Series</i> .....	120
M-W—Miscellaneous water .....	107	33A—Savage silty clay loam, 0 to 2 percent slopes .....	121
<i>Neldore Series</i> .....	107	33C—Savage silty clay loam, 2 to 8 percent slopes .....	122
58D—Neldore-Rock outcrop complex, 4 to 15 percent slopes .....	108	<i>Shambo Series</i> .....	122
58E—Neldore-Rock outcrop complex, 15 to 45 percent slopes .....	108	31C—Shambo loam, 2 to 8 percent slopes .....	123
158D—Neldore clay, 4 to 15 percent slopes ...	108	<i>Tanna Series</i> .....	123
358D—Neldore-Bascovy clays, 4 to 15 percent slopes .....	109	64C—Tanna silty clay loam, 2 to 8 percent slopes .....	124
<i>Orinoco Series</i> .....	109	164C—Tanna-Ethridge silty clay loams, 2 to 8 percent slopes .....	124
153D—Orinoco-Yawdim silty clay loams, 4 to 15 percent slopes .....	110	164D—Tanna-Ethridge silty clay loams, 8 to 15 percent slopes .....	125
253D—Orinoco-Weingart complex, 4 to 15 percent slopes .....	111	<i>Tricart Series</i> .....	125
<i>Pachel Series</i> .....	111	23D—Tricart loam, 4 to 15 percent slopes .....	126
135B—Pachel loam, 0 to 4 percent slopes .....	112	<i>Twilight Series</i> .....	127
<i>Parchin Series</i> .....	113	69C—Twilight fine sandy loam, 2 to 8 percent slopes .....	127
21C—Parchin fine sandy loam, 2 to 8 percent slopes .....	114	69D—Twilight fine sandy loam, 8 to 15 percent slopes .....	128
121C—Parchin-Bullock complex, 2 to 8 percent slopes .....	114	269C—Twilight-Bonfri complex, 2 to 8 percent slopes .....	128
<i>Prego Series</i> .....	114	269D—Twilight-Bonfri complex, 8 to 15 percent slopes .....	129

369C—Twilight-Delpoint complex, 2 to 8 percent slopes .....	129	86D—Yamacall loam, 8 to 15 percent slopes .....	141
369D—Twilight-Cabbart complex, 8 to 15 percent slopes .....	130	186A—Yamacall-Havre loams, 0 to 2 percent slopes .....	142
<i>Varney Series</i> .....	130	186C—Yamacall-Havre loams, 2 to 8 percent slopes .....	142
22A—Varney loam, 0 to 2 percent slopes .....	131	286C—Yamacall-Delpoint loams, 2 to 8 percent slopes .....	143
22C—Varney loam, 2 to 8 percent slopes .....	132	386E—Yamacall-Cabbart loams, 15 to 35 percent slopes .....	143
122C—Varney-Gerdrum complex, 2 to 8 percent slopes .....	132	486D—Yamacall-Busby-Blacksheep complex, 4 to 15 percent slopes .....	144
<i>Vebar Series</i> .....	133	586C—Yamacall loam, calcareous, 2 to 8 percent .....	144
40C—Vebar fine sandy loam, 2 to 8 percent slopes .....	133	586D—Yamacall-Delpoint-Cabbart loams, 8 to 15 percent slopes .....	145
140D—Vebar-Cohagen fine sandy loams, 4 to 15 percent slopes .....	134	<i>Yawdim Series</i> .....	145
<i>Wabek Series</i> .....	134	162D—Yawdim silty clay loam, 4 to 15 percent slopes .....	146
73E—Wabek sandy loam, 8 to 25 percent slopes .....	135	262E—Yawdim-Blacksheep-Rock outcrop complex, 15 to 45 percent slopes .....	146
173E—Wabek gravelly sandy loam, 8 to 35 percent slopes .....	136	<i>Ynot Series</i> .....	147
W—Water .....	136	59A—Ynot sandy loam, 0 to 2 percent slopes .....	148
<i>Wayden Series</i> .....	136	59C—Ynot sandy loam, 2 to 8 percent slopes .....	148
218D—Wayden-Barkof complex, 4 to 15 percent slopes .....	137	59D—Ynot sandy loam, 8 to 15 percent slopes .....	149
<i>Weingart Series</i> .....	137	<i>Zeona Series</i> .....	149
15C—Weingart clay loam, 2 to 8 percent slopes .....	138	119D—Zeona-Blacksheep-Rock outcrop complex, 4 to 15 percent slopes .....	149
<i>Winifred Series</i> .....	139	<b>References</b> .....	151
128D—Winifred silty clay loam, 4 to 15 percent slopes .....	139	<b>Glossary</b> .....	153
<i>Yamacall Series</i> .....	140		
86A—Yamacall loam, 0 to 2 percent slopes .....	141		
86C—Yamacall loam, 2 to 8 percent slopes .....	141		

---

**Part II**

<b>How To Use This Soil Survey</b> .....	i	<b>Recreation</b> .....	107
<b>Detailed Soil Map Unit Legend</b> .....	iv	<b>Wildlife Habitat</b> .....	127
<b>Summary of Tables</b> .....	viii	Elements of Wildlife Habitat .....	127
<b>Agronomy</b> .....	7	Kinds of Wildlife Habitat .....	127
Cropland Limitations and Hazards .....	7	Wildlife of Fallon County .....	128
Crop Yield Estimates .....	9	<b>Engineering</b> .....	129
Pasture and Hayland Management .....	9	Building Site Development .....	129
Land Capability Classification .....	9	Sanitary Facilities .....	130
Prime Farmland and Other Important		Waste Management .....	131
Farmland .....	10	Construction Materials .....	132
Erosion Factors .....	11	Water Management .....	133
Windbreaks and Environmental		<b>Soil Properties</b> .....	211
Plantings .....	12	Engineering Index Properties .....	211
<b>Range</b> .....	61	Physical and Chemical Properties .....	212
Similarity Index .....	62	Water Features .....	214
Rangeland Management .....	62	Soil Features .....	215
		<b>References</b> .....	323
		<b>Glossary</b> .....	325

# Index to Taxonomic Units

---

Abor Series .....	18	Hanly Series .....	89
Absher Series .....	20	Harlake Series .....	90
Adger Series .....	21	Havre Series .....	91
Alona Series .....	23	Kirby Series .....	93
Archin Series .....	24	Kobase Series .....	95
Assinniboine Series .....	28	Kremlin Series .....	97
Barkof Series .....	31	Lonna Series .....	99
Bascovy Series .....	32	Marmarth Series .....	104
Benz Series .....	33	Marvan Series .....	105
Blacksheep Series .....	34	Neldore Series .....	107
Bonfri Series .....	37	Orinoco Series .....	109
Bullock Series .....	40	Pachel Series .....	111
Busby Series .....	41	Parchin Series .....	113
Cabba Series .....	44	Prego Series .....	114
Cabbart Series .....	47	Reeder Series .....	116
Cambert Series .....	50	Regent Series .....	118
Cambeth Series .....	52	Ryell Series .....	119
Carfall Series .....	55	Savage Series .....	120
Chanta Series .....	57	Shambo Series .....	122
Chinook Series .....	58	Tanna Series .....	123
Cohagen Series .....	62	Tricart Series .....	125
Cooers Series .....	62	Twilight Series .....	127
Creed Series .....	64	Varney Series .....	130
Daglun Series .....	67	Vebar Series .....	133
Dast Series .....	71	Wabek Series .....	134
Delpoint Series .....	72	Wayden Series .....	136
Eapa Series .....	75	Weingart Series .....	137
Ethridge Series .....	77	Winifred Series .....	139
Farnuf Series .....	80	Yamacall Series .....	140
Floweree Series .....	81	Yawdim Series .....	145
Gerdrum Series .....	83	Ynot Series .....	147
Glendive Series .....	86	Zeona Series .....	149
Grail Series .....	88		

# Index to Map Units

---

7B—Hanly-Ryell fine sandy loams, 0 to 4 percent slopes .....	89	55D—Blacksheep-Twilight fine sandy loams, 8 to 15 percent slopes .....	35
8E—Cooers-Kirby-Rock outcrop complex, 8 to 25 percent slopes .....	63	55E—Blacksheep-Twilight fine sandy loams, 15 to 45 percent slopes .....	35
11C—Benz clay loam, 2 to 8 percent slopes .....	34	56A—Havre loam, 0 to 2 percent slopes .....	92
13F—Badland .....	30	57A—Harlake silty clay, saline, 0 to 2 percent slopes .....	91
14C—Carfall loam, 2 to 8 percent slopes .....	55	58D—Neldore-Rock outcrop complex, 4 to 15 percent slopes .....	108
15C—Weingart clay loam, 2 to 8 percent slopes .....	138	58E—Neldore-Rock outcrop complex, 15 to 45 percent slopes .....	108
20C—Alona silt loam, 2 to 8 percent slopes .....	24	59A—Ynot sandy loam, 0 to 2 percent slopes .....	148
21C—Parchin fine sandy loam, 2 to 8 percent slopes .....	114	59C—Ynot sandy loam, 2 to 8 percent slopes .....	148
22A—Varney loam, 0 to 2 percent slopes .....	131	59D—Ynot sandy loam, 8 to 15 percent slopes .....	149
22C—Varney loam, 2 to 8 percent slopes .....	132	60C—Cambeth silt loam, 2 to 8 percent slopes .....	53
23D—Tricart loam, 4 to 15 percent slopes .....	126	60D—Cabbart silt loam, 4 to 15 percent slopes .....	48
27C—Barkof clay, 2 to 8 percent slopes .....	32	61A—Glendive sandy loam, 0 to 2 percent slopes .....	87
31C—Shambo loam, 2 to 8 percent slopes .....	123	64C—Tanna silty clay loam, 2 to 8 percent slopes .....	124
33A—Savage silty clay loam, 0 to 2 percent slopes .....	121	65A—Gerdrum clay loam, 0 to 2 percent slopes .....	84
33C—Savage silty clay loam, 2 to 8 percent slopes .....	122	65C—Gerdrum clay loam, 2 to 8 percent slopes .....	85
34C—Regent clay loam, 2 to 8 percent slopes .....	119	69C—Twilight fine sandy loam, 2 to 8 percent slopes .....	127
35A—Farnuf loam, 0 to 2 percent slopes .....	80	69D—Twilight fine sandy loam, 8 to 15 percent slopes .....	128
35C—Farnuf loam, 2 to 8 percent slopes .....	81	70C—Busby fine sandy loam, 2 to 8 percent slopes .....	41
40C—Vebar fine sandy loam, 2 to 8 percent slopes .....	133	70D—Busby fine sandy loam, 8 to 15 percent slopes .....	42
42C—Reeder loam, 2 to 8 percent slopes .....	116	71C—Delpoint loam, 2 to 8 percent slopes .....	72
43B—Grail silt loam, 0 to 4 percent slopes .....	88	72A—Kremlin loam, 0 to 2 percent slopes .....	98
45A—Daglum loam, 0 to 2 percent slopes .....	68	72C—Kremlin loam, 2 to 8 percent slopes .....	98
45C—Daglum loam, 2 to 8 percent slopes .....	69		
48D—Prego sandy loam, 2 to 15 percent slopes .....	115		
50A—Chanta loam, 0 to 2 percent slopes .....	58		
50C—Chanta loam, 2 to 8 percent slopes .....	58		
51C—Abor silty clay loam, 2 to 8 percent slopes .....	19		
54A—Creed loam, 0 to 2 percent slopes .....	65		
54C—Creed loam, 2 to 8 percent slopes .....	66		

73E—Wabek sandy loam, 8 to 25 percent slopes .....	135	90C—Bascovy clay, 2 to 8 percent slopes .....	33
74A—Assinniboine sandy clay loam, 0 to 2 percent slopes .....	29	91C—Bonfri loam, 2 to 8 percent slopes .....	37
74C—Assinniboine sandy clay loam, 2 to 8 percent slopes .....	29	91D—Bonfri loam, 8 to 15 percent slopes .....	38
75A—Archin-Absher complex, 0 to 2 percent slopes .....	25	93A—Lonna silt loam, 0 to 2 percent slopes .....	100
75C—Archin-Absher complex, 2 to 8 percent slopes .....	26	93C—Lonna silt loam, 2 to 8 percent slopes .....	100
78C—Kobase silty clay loam, 2 to 8 percent slopes .....	96	112C—Cambert-Cabba complex, 2 to 8 percent slopes .....	51
81C—Marmarth loam, 2 to 8 percent slopes .....	105	112D—Cabba-Cambert complex, 4 to 15 percent slopes .....	45
82A—Floweree silt loam, 0 to 2 percent slopes .....	82	113F—Badland-Benz-Parchin complex, 0 to 70 percent slopes .....	30
82C—Floweree silt loam, 2 to 8 percent slopes .....	83	114C—Carfall-Assinniboine complex, 2 to 8 percent slopes .....	56
83A—Chinook sandy loam, 0 to 2 percent slopes .....	60	114D—Carfall-Assinniboine complex, 8 to 15 percent slopes .....	56
83C—Chinook sandy loam, 2 to 8 percent slopes .....	60	119D—Zeona-Blacksheep-Rock outcrop complex, 4 to 15 percent slopes .....	149
83D—Chinook sandy loam, 8 to 15 percent slopes .....	60	121C—Parchin-Bullock complex, 2 to 8 percent slopes .....	114
84A—Eapa loam, 0 to 2 percent slopes .....	76	122C—Varney-Gerdrum complex, 2 to 8 percent slopes .....	132
84C—Eapa loam, 2 to 8 percent slopes .....	76	128D—Winifred silty clay loam, 4 to 15 percent slopes .....	139
84D—Eapa loam, 8 to 15 percent slopes .....	77	135B—Pachel loam, 0 to 4 percent slopes .....	112
85A—Ethridge silty clay loam, 0 to 2 percent slopes .....	79	140D—Vebar-Cohagen fine sandy loams, 4 to 15 percent slopes .....	134
85C—Ethridge silty clay loam, 2 to 8 percent slopes .....	79	142D—Reeder-Cabba loams, 4 to 15 percent slopes .....	117
86A—Yamacall loam, 0 to 2 percent slopes .....	141	142E—Reeder-Cabba loams, 15 to 45 percent slopes .....	117
86C—Yamacall loam, 2 to 8 percent slopes .....	141	145A—Daglum-Adger complex, 0 to 2 percent slopes .....	69
86D—Yamacall loam, 8 to 15 percent slopes .....	141	145C—Daglum-Adger complex, 2 to 8 percent slopes .....	69
89A—Marvan silty clay, 0 to 2 percent slopes .....	106	153D—Orinoco-Yawdim silty clay loams, 4 to 15 percent slopes .....	110
89C—Marvan silty clay, 2 to 8 percent slopes .....	106	154C—Creed-Absher complex, 2 to 8 percent slopes .....	66

---

155E—Blacksheep-Rock outcrop complex, 25 to 50 percent .....	36	173E—Wabek gravelly sandy loam, 8 to 35 percent slopes .....	136
156A—Havre loam, saline, 0 to 2 percent slopes .....	93	174C—Assinniboine-Ynot complex, 2 to 8 percent slopes .....	30
157A—Harlake silty clay loam, 0 to 2 percent slopes .....	91	175A—Archin loam, 0 to 2 percent slopes .....	26
158D—Neldore clay, 4 to 15 percent slopes ...	108	175C—Archin loam, 2 to 8 percent slopes .....	27
160D—Cambeth-Lonna silt loams, 8 to 15 percent slopes .....	53	176D—Kirby-Cabbart complex, 8 to 25 percent slopes .....	94
160E—Cabbart-Rock outcrop-Delpoint complex, 15 to 50 percent slopes .....	48	183C—Chinook-Assinniboine complex, 2 to 8 percent slopes .....	61
160F—Cabbart-Rock outcrop-Yawdim complex, 15 to 70 percent slopes .....	49	186A—Yamacall-Havre loams, 0 to 2 percent slopes .....	142
161B—Glendive sandy loam, saline, 0 to 4 percent slopes .....	87	186C—Yamacall-Havre loams, 2 to 8 percent slopes .....	142
162D—Yawdim silty clay loam, 4 to 15 percent slopes .....	146	191C—Bonfri-Cambeth complex, 2 to 8 percent slopes .....	38
164C—Tanna-Ethridge silty clay loams, 2 to 8 percent slopes .....	124	193C—Lonna-Cambeth silt loams, 2 to 8 percent slopes .....	101
164D—Tanna-Ethridge silty clay loams, 8 to 15 percent slopes .....	125	193D—Lonna-Cambeth-Cabbart silt loams, 4 to 12 percent slopes .....	101
165A—Gerdrum-Absher complex, 0 to 2 percent slopes .....	85	218D—Wayden-Barkof complex, 4 to 15 percent slopes .....	137
165C—Gerdrum-Absher complex, 2 to 8 percent slopes .....	86	242D—Reeder-Dast complex, 4 to 15 percent slopes .....	118
166C—Ethridge loam, 2 to 8 percent slopes ....	79	245A—Daglum loam, dry, 0 to 2 percent slopes .....	70
167C—Eapa-Yamacall loams, 2 to 8 percent slopes .....	77	245C—Daglum loam, dry, 2 to 8 percent slopes .....	70
168B—Absher-Gerdrum complex, 0 to 4 percent slopes .....	21	251D—Abor-Yawdim silty clay loams, 4 to 15 percent slopes .....	19
170D—Busby-Blacksheep-Twilight fine sandy loams, 8 to 25 percent slopes .....	42	253D—Orinoco-Weingart complex, 4 to 15 percent slopes .....	111
170E—Busby-Blacksheep-Rock outcrop complex, 8 to 25 percent slopes .....	43	254C—Creed-Gerdrum complex, 2 to 8 percent slopes .....	67
171C—Delpoint-Cabbart complex, 2 to 8 percent slopes .....	73	256A—Havre-Harlake complex, 0 to 2 percent slopes .....	93
171D—Delpoint-Cabbart complex, 8 to 15 percent slopes .....	73	260C—Cambeth-Cabbart silt loams, 2 to 8 percent slopes .....	54
172C—Kremlin-Cabbart complex, 2 to 8 percent slopes .....	98	260D—Cabbart-Cambeth silt loams, 8 to 15 percent slopes .....	49

---

260E—Cambeth-Cabbart-Yawdim complex, 15 to 25 percent slopes .....	54	360D—Cabbart-Bascovy complex, 4 to 15 percent slopes .....	50
262E—Yawdim-Blacksheep-Rock outcrop complex, 15 to 45 percent slopes .....	146	369C—Twilight-Delpoint complex, 2 to 8 percent slopes .....	129
269C—Twilight-Bonfri complex, 2 to 8 percent slopes .....	128	369D—Twilight-Cabbart complex, 8 to 15 percent slopes .....	130
269D—Twilight-Bonfri complex, 8 to 15 percent slopes .....	129	371E—Delpoint-Cooers-Kirby complex, 15 to 35 percent slopes .....	74
270E—Busby, gullied-Delpoint-Yawdim complex, 8 to 25 percent slopes .....	43	375C—Archin-Ynot complex, 2 to 8 percent slopes .....	28
271D—Delpoint-Yamacall loams, 8 to 15 percent slopes .....	74	386E—Yamacall-Cabbart loams, 15 to 35 percent slopes .....	143
275D—Archin, gullied-Delpoint complex, 4 to 15 percent slopes .....	27	391C—Bonfri-Parchin complex, 2 to 8 percent slopes .....	39
276F—Kirby-Blacksheep-Rock outcrop complex, 25 to 60 percent slopes .....	95	393E—Lonna-Cambeth-Cabbart silt loams, 12 to 25 percent slopes .....	103
283C—Chinook-Archin complex, 2 to 8 percent slopes .....	61	412E—Cabba-Wayden complex, 8 to 45 percent slopes .....	46
286C—Yamacall-Delpoint loams, 2 to 8 percent slopes .....	143	486D—Yamacall-Busby-Blacksheep complex, 4 to 15 percent slopes .....	144
291D—Bonfri-Cabbart loams, 8 to 15 percent slopes .....	39	512E—Cabba-Dast complex, 15 to 25 percent slopes .....	46
293C—Lonna-Cabbart silt loams, 2 to 8 percent slopes .....	102	586C—Yamacall loam, calcareous, 2 to 8 percent .....	144
293D—Lonna-Cabbart silt loams, 8 to 25 percent slopes .....	103	586D—Yamacall-Delpoint-Cabbart loams, 8 to 15 percent slopes .....	145
312D—Cabba-Dast complex, 8 to 15 percent slopes .....	45	M-W—Miscellaneous water .....	107
358D—Neldore-Bascovy clays, 4 to 15 percent slopes .....	109	W—Water .....	136

# Summary of Tables

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Temperature and precipitation .....	6
Freeze dates in spring and fall .....	7
Growing season .....	8

For tables with the most current data, please visit the  
Soil Data Mart at <http://soildatamart.nrcs.usda.gov/>.

# Foreword

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This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at local offices of the Natural Resources Conservation Service or the Cooperative Extension Service.

Dave White  
State Conservationist  
Natural Resources Conservation Service

# Soil Survey of Fallon County, Montana

Fieldwork by Richard G. Bandy, Gary F. Berger, James F. Dorr, William J. Drummond, Michael S. Koehler, John A. Lindahl, Dan L. McLean, and Kenneth T. Scalzone, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with the United States Department of Interior, Bureau of Land Management, and the Montana Agricultural Experiment Station

FALLON COUNTY was established on December 9, 1913, and is located on the rolling plains of southeastern Montana (fig. 1). It has a land area of about 1,039,100 acres, or 1,623 square miles. About 25 percent of the county is used for dryland crops, and the remainder is used mainly for range. The principal dryland crops are barley, grass-legume hay, pasture, spring wheat, and winter wheat. Beef cattle, oil production, and small grains are the main economic enterprises.

Elevations range from 2,580 to 3,551 feet. Mean annual precipitation ranges from 10 to 19 inches, and the frost-free period ranges from 110 to 130 days.

## General Nature of the Survey Area

This section describes some of the environmental and cultural features that affect the use and management of soils in the survey area. These features are history; industry, transportation, and recreation; physiography and drainage; geology; mineral and ground-water resources; and climate.

## History

The largest town in Fallon County is Baker, which is also the center of commerce and the county seat. Baker was named for A. G. Baker, chief engineer responsible for building the Milwaukee Railroad through eastern Montana. The only other place of significant population is the town of Plevna, located 12 miles west of Baker. Small towns were established throughout the county in the early 1900s, but today only the names remain.

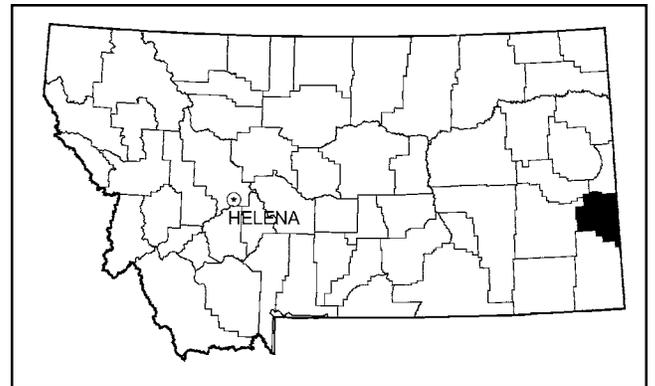


Fig. 1.—Location of Fallon County, Montana

Cattle arrived in the county in the late 1800s, and the first ranch was established along O'Fallon Creek in 1892. By the end of 1908, the railroad was completed through the county, and soon homesteaders began arriving in large numbers. By 1912, the population was approaching 1,000 and growing rapidly. Most of the pioneers were from the midwestern and eastern United States; others were recent immigrants from China, Russia, and Western Europe.

Gas was discovered in 1915, and, by 1916, it was being piped into homes and businesses. Oil was suspected to exist in the county; however, it was not until 1936 that the first oil-producing well was drilled. Oil and gas exploration, production, and support industries continue to play a major role in the development and economy of Fallon County.

## Industry, Transportation, and Recreation

The principal industries in Fallon County are farming, livestock, and oil production.

The principal dryland farming crops are barley, grass-legume hay, pasture, spring wheat, and winter wheat. Some alfalfa and grass hay are grown on waterspreading systems along Beaver, O'Fallon, and Sandstone Creeks. Nearly all of the small grain produced is marketed through elevators in Baker and Miles City.

The livestock industry is mainly cow-calf operations and accounts for nearly 57 percent of farm and ranch income. Baker Livestock Auction Yard provides a good livestock marketing facility. Some calves are sold directly off the ranches to feeder buyers.

The Cedar Creek area is an important oil field in Fallon County. This field produces oil that is shipped via pipeline to the Denver, Colorado, area for refining.

U.S. Highway 12 runs east and west through the central portion of the county. State Route 7 runs north and south through the eastern part of the county. Numerous farm-to-market roads provide access throughout the county.

Fallon County provides numerous opportunities for outdoor recreation. Antelope, mule deer, and white-tailed deer offer excellent big game hunting. Upland game birds, such as Hungarian partridge and sage and sharp-tail grouse, provide hunting opportunities. Camping, fishing, and water recreation activities are accessible at Baker and at the South Sandstone Reservoir. Smaller ponds throughout the county also provide good fishing.

## Physiography and Drainage

Fallon County is located on the Missouri Plateau in the Great Plains physiographic province. The area consists predominantly of gently rolling plains with shallow creek valleys and broad, flat divides. The semiarid landscape is punctuated by occasional badlands and bright red ridge tops.

Landscapes typical of the western part of the county are flat-topped buttes and ridges capped by sandstone or resistant baked shale (scoria) beds. More subdued topography is found in a wide strip trending northwest through Baker across the county. This band is the surface expression of the Cedar Creek Anticline, a sharply folded, asymmetrical arch, which extends southeast into South Dakota.

Elevations range from a high of 3,551 feet at Anderson Butte (1.5 miles southeast of Willard) to a

low of 2,580 feet at Sandstone Creek (downstream from Westmore at the county's western border). The land slopes gently downward from the Willard area, in the southern end of the county, to Baker, with an elevation of approximately 3,000 feet. Elevation then rises to the Big Hill in the northeastern corner of the county. Several small buttes on the Big Hill rise to elevations over 3,300 feet, including Shell Butte at an elevation of 3,376 feet.

Drainage patterns parallel the southeastern structural trend of the Cedar Creek Anticline (in the central portion of the county), then turn and flow to the northwest. Major drainages from north to south are Pennel Creek, Sandstone Creek, and O'Fallon Creek. Little Beaver Creek flows northeast across the anticline through the southeastern corner of the county. Little Beaver and O'Fallon Creeks are considered perennial; however, none of the streams in the county are perennial for their entire length.

The streams follow meandering courses in wide, nearly level valley bottoms. They are primarily depositional, with deeper soils in the drainages than in the surrounding hills. In the area south of Baker, the streams are eroding and have cut through to bedrock.

## Geology

The oldest rocks exposed in Fallon County belong to sedimentary formations deposited during the Upper Cretaceous Period. This period began less than 100 million years ago. During this time, a transcontinental sea covered the area between the Gulf of Mexico and the Arctic Ocean. Thick sequences of sediments were deposited on coastal plains and shallow sea floors during alternating periods of emergence and submergence. These repeated marine invasions deposited an alternating sequence of marine shales on the sea floor and brackish and freshwater shales and sandstones on the coastal plains. The river valleys and coastlines were swampy and covered with lush vegetation. Accumulating sediment subsequently buried the vegetation; it was later converted to coal.

Marine migrations continued without interruption until the Late-Cretaceous Period of 90-million years ago. At this time, the uplift of the Rocky Mountains began in western Montana. In Fallon County, marine deposition ended with the Hell Creek Formation, the last unit to be deposited in the Late-Cretaceous Period. The extinction of the dinosaurs occurred approximately 65-million years ago and marked the end of the Cretaceous Period. While the fossils

changed dramatically, the character of the sediments remained the same. The relatively resistant, reddish baked shale beds capping ridges were formed by burning underground coal seams of Tertiary age, which baked the surrounding sediments.

Major uplift and granitic intrusions in the Black Hills occurred approximately 50-million years ago. These intrusions were accompanied by regional folding and faulting, including the formation of the Cedar Creek Anticline. The anticline is a total of 120 miles long and trends southeast through the eastern half of Fallon County. South of Baker, in the Little Beaver Dome, this anticline is 14-miles wide. The folded rocks act as a trap for oil and gas migrating upward from underlying formations, creating one of the major oil- and gas-producing regions of Montana.

The sequence of rocks exposed in Fallon County is summarized below in order of decreasing age. The classification of rock units based on their lithology is listed from largest to smallest: group, formation, and member. For example, formations are subdivided into members. "Systems" are the rocks deposited during a particular geologic period.

### **Cretaceous System (135 to 65 mybp)**

Pierre Shale is the oldest formation exposed in the county and crops out only in the center of the Cedar Creek Anticline. It is approximately 3,100-feet thick and consists primarily of impure, dark gray marine shale. Interbedded in the shale are bentonite beds, iron concretions, limestone concretions, gypsum veins and crystals, and local sandstone lenses. Many saline pan spots are associated with this formation. On weathered exposures, gypsum crystals glitter in the sun like broken glass. The randomly occurring sandstone beds may yield small quantities of highly mineralized water. This water is unsuitable for any use, and the formation is not considered as a ground-water aquifer. Small lenses of clean, round quartz pebbles that weathered from the Pierre Shale can be found capping small rises. Typical soils derived from this formation include the Bascovy, Gerdrum, and Neldore series.

The overlying Fox Hills Sandstone consists of marine and brackish water deposits of cross-bedded sandstone, shale, and siltstone. It is 100- to 150-feet thick and crops out in a relatively narrow band. In this part of Montana, the upper member of the Fox Hills Sandstone is identified as the Colgate Member. It consists of permeable, light gray sandstone and is approximately 40-feet thick. The formation becomes more shaley with depth and grades into the underlying Pierre Shale. Typical soils derived from

this formation include the Blacksheep and Twilight series.

The Hell Creek Formation consists of nonmarine and brackish water deposits of sandstone, shale, and lignite and is the last layer to contain dinosaur fossils. The formation becomes sandier with depth and, together with the underlying Colgate Member, forms a relatively thick and continuous regional aquifer. This aquifer supplies much of the domestic water and stock water in the region. Typical soils derived from this formation include the Archin, Eapa, and Ynot series.

### **Tertiary System (65 to 2.5 mybp)**

The Fort Union Formation overlies the Hell Creek Formation. The Fort Union Formation, a maximum of 600-feet thick, is subdivided into the lower Ludlow Member and the overlying Tongue River Member. Like the Hell Creek Formation, the Fort Union Formation consists of sandstone, shale, and coal beds. Brick-red ridgetops formed from baked shale give it a distinctive appearance. Thin, sandy soils that mantle the sandstone ridges and deeper soils occurring on the intermediate valleys eroded into shales. There are 6- to 12-foot thick gravel terraces associated with this formation. These terraces are both cleaner and younger than the gravel terraces associated with the Pierre Shale.

In the Tongue River Member, shale occurs more frequently than sandstone. This shale weathers rapidly to soil-covered slopes and is not as conspicuous as the sandstones and baked shale. The Tongue River Member is the chief coal-bearing formation in eastern Montana and contains many thick coal beds. Typical soils derived from this formation include the Cabbart, Cambeth, and Eapa series. The Kirby soil developed on baked shale.

The Ludlow Member consists of interbedded sandstone, siltstone, and shale. This member weathers to badland-type topography. Coal in the Ludlow Member occurs as thin, lenticular beds. Typical soils derived from this formation include the Archin, Bonfri, and Chinook series.

## **Mineral and Ground-Water Resources**

Fallon County is contained within eastern Montana's region of oil and gas production. The producing oil and gas fields are in scattered, deep-seated high points that lie along the crest of the Cedar Creek Anticline.

Oil and gas are produced from different stratigraphic horizons. Their accumulation is a factor

of both the anticlinal structure and porosity variations within the individual formations. Gas is produced from the Upper Cretaceous-aged Judith River and Eagle Formations at drill depths between 600 and 1,500 feet. Oil is produced from Silurian- and Ordovician-aged formations (500 to 400 million years ago) at drill depths of between 1 and 2 miles.

At present (1991), no mining activity in Fallon County is listed in the state of Montana's Directory of Montana Mining Enterprises. Although economic and potentially economic deposits of coal are present in the area, they have undergone little development.

Ground water in Fallon County is obtained primarily from the Fox Hills-Lower Hell Creek Aquifer in locations where the overlying Fort Union Formation is not too thick. Because of the controlling structure of the Cedar Creek Anticline, these wells are under artesian conditions, and many flow at the surface. The total dissolved solids of the water from this aquifer are generally low, ranging from under 500 mg/l to 2,000 mg/l. Yields are as high as 50 gallons-per-minute (gpm).

Unconsolidated alluvium deposits are found in valleys of larger streams, in thicknesses of up to 50 feet or more. They are also commonly used for ground water development. These deposits consist of interbedded clay, silt, sand, and gravel. They can yield as much as 600 gpm.

In the Fort Union Formation, the Tongue River Member typically yields 8 to 15 gpm, and the Ludlow Member typically yields 3 to 8 gpm. The water is produced from sandstone and baked shale beds. These beds occur frequently but occur as discontinuous lenses with limited aerial extent. Their exact locations are impossible to predict at a particular site. Shallow wells often fail after years of use when the limited sandstone lens is completely drained.

Water in the Fort Union Formation contains total dissolved solids (TDS) ranging from 950 to 3,500 mg/l. The best quality water is obtained from scoria beds. The Environmental Protection Agency has recommended a maximum TDS content of 500 mg/l for human consumption. Water with greater than 7,000 mg/l TDS is generally considered unfit for any use.

The Montana Bureau of Mines and Geology's Open File Report 026, "Compilation of Hydrogeological Data for Southeastern Montana," reported 838 wells in 1977 (Miller and others, 1977).

Their average depth was 275 feet with average static water levels of 79 feet. The static water level in 70 percent of the wells was less than 150 feet. In 1990 the number of wells increased to 1,071.

## Climate

Following this section are tables giving data on temperature and precipitation, probable dates of the first freeze in fall and the last freeze in spring, and data on length of the growing season.

Growing-degree days are equivalent to "heat units." During the month, growing-degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

## How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. This information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the survey area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, soil scientists develop a concept, or model, of how the soils were formed. During mapping, this model enables soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to

verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size, and shape of soil aggregates; kind and amount of rock fragments; distribution of plant roots; reaction; and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret data from these analyses and tests as well as field-observed characteristics and soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are

developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data for crop yields under high levels of management are modeled and validated with farm records and field or plot information on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Descriptions, names, and delineations of the soils in this survey area may not fully agree with those of the soils in adjacent survey areas. Differences result from a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas. The Wibaux County, Montana, soil survey (United States Department of Agriculture, 1958) is out-of-date, requiring extensive revision, and it does not join Fallon County in many areas.

Temperature and Precipitation  
(Recorded in the period 1964-1994 at Plevna)

Month	Temperature (Degrees F)					Precipitation* (Inches)					
	Average Daily Maximum	Average Daily Minimum	Average	2 Years in 10 Will Have-		Average Number of Growing- Degree Days**	Average	2 years in 10 Will Have-		Average Number of Days With 0.10 or More	Average Total Snowfall
				Maximum Temperature More Than	Minimum Temperature Less Than			Less Than	More Than		
PLEVNA:											
January---	28.2	2.9	15.6	56	-35	2	0.57	0.25	0.93	2	6.7
February--	34.0	9.4	21.7	59	-26	4	0.36	0.20	0.75	1	3.1
March-----	45.0	19.2	32.1	74	-16	43	0.68	0.22	1.11	2	6.1
April-----	59.0	30.4	44.7	85	8	192	1.48	0.55	2.34	3	3.0
May-----	70.3	40.7	55.5	93	22	455	2.18	1.20	3.17	5	0.7
June-----	79.8	49.8	64.8	100	33	717	2.68	1.26	3.91	5	0.0
July-----	88.5	55.0	71.8	106	39	929	1.83	0.91	2.75	4	0.0
August----	86.9	52.3	69.6	103	35	877	1.44	0.69	2.27	3	0.0
September-	75.2	41.8	58.5	100	23	526	1.46	0.46	2.28	3	0.4
October---	62.0	30.6	46.3	87	6	222	1.00	0.33	1.62	2	0.9
November--	43.1	17.9	30.5	71	-15	30	0.53	0.28	0.86	2	4.1
December--	31.1	7.0	19.1	57	-32	2	0.47	0.19	0.82	2	5.8
Yearly:											
Average---	58.6	29.8	44.2	---	---	---	---	---	---	---	---
Extreme---	110.0	-49.0	---	106	-37	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,999	14.70	10.86	17.39	34	30.8

\* Average number of days per year with at least 1 inch of snow on the ground: 34.

\*\* A growing-degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (Threshold: 40.0 degrees F).

Freeze Dates in Spring and Fall  
(Recorded in the period 1964-1994 at Plevna)

Probability	Temperature		
	24 degrees F or lower	28 degrees F or lower	32 degrees F or lower
<b>PLEVNA:</b>			
Last freezing temperature in spring: January-July			
1 year in 10 later than----	May 12	May 22	June 2
2 years in 10 later than---	May 6	May 17	May 27
5 years in 10 later than---	April 26	May 7	May 16
First freezing temperature in fall: August-December			
1 year in 10 earlier than--	September 13	September 9	August 31
2 years in 10 earlier than-	September 21	September 13	September 5
5 years in 10 earlier than-	October 4	September 23	September 14

Growing Season  
(Recorded in the period 1964-1994 at Plevna)

Probability	Daily Minimum Temperature		
	Higher than 24 degrees F	Higher than 28 degrees F	Higher than 32 degrees F
	<i>Days</i>	<i>Days</i>	<i>Days</i>
PLEVNA:			
9 years in 10-----	139	117	97
8 years in 10-----	146	125	105
5 years in 10-----	160	139	121
2 years in 10-----	174	153	138
1 year in 10-----	181	160	146

# Formation and Classification of the Soils

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This section relates the soils in the survey area to the major factors of soil formation and describes the system of soil classification. The tables, "Classification of the Soils" and "Acreage and Proportionate Extent of the Soils," at the end of this section show the classification and extent of the soils in this survey area.

## Formation of the Soils

Soil is a natural, three-dimensional body on the earth's surface. Soil has properties that result from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over a period of time.

Although there are many different soils, each soil is the result of the interaction of the same five factors. These factors are the effect of climate on the parent material, the kinds of plants and organisms living in the soil, the relief of the land, the physical and chemical composition of the parent material, and the length of time it took for the soil to form.

Within short distances, the combination of these factors varies, and, consequently, the soils that form differ in fertility, productivity, and physical and chemical characteristics. In the following paragraphs, the factors of soil formation are discussed as they relate to the soils in the survey area.

## Climate

Temperature and precipitation mainly determine climate, an active force in the formation of soils. Soils form in rocks that have been broken into suitable materials by erosion and alternate freezing and thawing. Chemical reactions, such as solution and hydration, further break down this weathered material.

Precipitation and temperature affect the kind and amount of vegetation that grows on the soil. Vegetation decays to produce organic matter in the soil. Soils that have cool temperatures and high precipitation generally contain more organic matter and are dark colored. Soils, such as the Lonna

series, that have warm temperatures and low precipitation generally contain less organic matter and are light colored. In Fallon County annual precipitation ranges from 13 to 17 inches.

## Living Organisms

Living organisms are active in the formation of soils. Plants, animals, insects, and microorganisms affect gains or losses in organic matter, plant nutrients in the soil, and changes in porosity and structure.

Roots, rodents, and insects penetrate the soil and alter its structure. Microorganisms, chemicals in the soil, and insects change leaves, roots, and entire plants that remain in the surface layer to humus. Fungi and algae also contribute to the decomposition of bedrock. Animals increase porosity by burrowing through the soil and leaving open channels for the movement of water and air. Many of the pebbles and cobbles on the surface of fans and terraces were brought up by burrowing rodents. Common rodents in the survey area are badger, field mice, ground squirrel, prairie dog, and rabbit. Some of the fragments on the surface of terraces, and on many other areas, were dug up by burrowing rodents.

In most areas native vegetation in Fallon County consists of short and mid grasses, forbs, and shrubs.

## Topography

Topography, or relief, is determined by glaciation and mountain formation and by the age and resistance of geologic formations to erosion by wind and water. Topography influences soil development through its effect on drainage and runoff. On the eroded uplands of this survey area, runoff water has carved deep intermittent drains with many branches into the original bedrock. This rugged relief contrasts sharply with the smooth low relief of the terraces and flood plains.

In the uplands, the number and distinctness of soil horizons decrease as slope increases. Soils on steep slopes with rapid runoff have many characteristics

similar to those of soils formed in arid climates. Nearly level to gently rolling soils have the characteristics of soils that form in the semiarid climate that is typical of Fallon County. Examples of this pattern are Cabbart and Floweree soils. The shallow Cabbart soil has strongly sloping to steep slopes and no B horizon. The nearly level to gently rolling Floweree soil is very deep and has a B horizon that is 7- to 17-inches thick.

## Parent Material

Most of the soils in Fallon County formed in place over semiconsolidated sedimentary beds or semiconsolidated shale. Many soils formed in alluvium and were deposited in valleys. Soils that formed in material derived from semiconsolidated sandy sedimentary beds, such as the Blacksheep series are generally sandy. Soils that formed in shale, such as the Bascovy series are clayey since clay is the basic constituent of shale. Soils that formed in mixed alluvium derived from semiconsolidated, loamy sedimentary beds, such as those of the Havre series are loamy.

Many of the soils in the county, such as the Alona series, have acquired salt and sodium from the parent material. These elements make the soils saline or alkali and limit the kind and amount of plants that can grow on them. The density of the parent rock and its mineral composition can limit the rate of weathering and the depth of the soil.

## Time

Change taking place in soils over a long period is called soil genesis. As a result of these changes, distinct horizons, or layers, develop in the soils. The length of time that parent materials have been in place and exposed to climate and living organisms is generally reflected in the degree to which the soil profile has developed. The kind and arrangement of these horizons are called soil morphology. These layers are described in terms of chemistry, color, consistence, permeability, structure, texture, and thickness.

Soils are classified according to their approximate age, from young to mature. Age, or maturity, of a soil is generally indicated by the thickness and distinctness of subsurface horizons, content of organic matter and clay, depth to which soluble material is leached, and form and distribution of calcium carbonate and gypsum in the soil.

Havre loam, a soil of the Entisol order, is an example of a young soil that formed in alluvium on a

flood plain. This soil contains little organic matter to form an A horizon and has no clay accumulation. Little translocation of carbonates has occurred.

Eapa loam formed in a parent material similar to, but much older than, the Havre soil. The Eapa soil formed in alluvium on fans and terraces. They are mature soils of the Mollisol order. They contain enough organic matter to have a dark-colored A horizon. They have a distinct clay accumulation in a B horizon, and nearly all of the carbonates have been leached below a depth of about 20 inches.

## Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1975 and 1990). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The table, "Classification of the Soils," shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

**ORDER.** Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol, from *mollis*, meaning soft.

**SUBORDER.** Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Boroll (*Bor*, meaning cool, plus *oll*, from Mollisol).

**GREAT GROUP.** Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Argiboroll (*Argi*, meaning having an argillic horizon or clay accumulation, plus *boroll*, the suborder of the Mollisols that has a cool climate).

**SUBGROUP.** Each great group has a typical subgroup. Other subgroups are intergrades or extragrades. The typical subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the

great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Argiborolls.

**FAMILY.** Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and

characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed Typic Argiborolls.

**SERIES.** The series consists of soils within a family that have horizons similar in arrangement in the profile, color, consistence, mineral and chemical composition, reaction, structure, and texture. An example is the Reeder series. The soils in the Reeder series are fine-loamy, mixed Typic Argiborolls.

## Soil Series and Detailed Soil Map Units

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In this section, arranged in alphabetical order, each soil series recognized in the survey area is described. Each description is followed by the detailed soil map units associated with the series.

Characteristics of the soil and the material in which it formed are identified for each soil series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 1962). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1975). Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class, there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are

called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and, consequently, they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all of the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, on-site investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all of the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is

divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Havre loam, 0 to 2 percent slopes, is a phase of the Havre series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

This survey includes *complexes*. They consist of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Cabbart-Rock outcrop-Delpoint complex, 15 to 50 percent slopes, is an example.

This survey includes *miscellaneous areas*. They have little or no soil material and support little or no vegetation. Badland is an example.

The "Acreage and Proportionate Extent of the Soils" table in Parts I and II of the manuscript gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. Many of the terms used in describing the soils or miscellaneous areas are defined in the "Glossary."

## Abor Series

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Very slow (<0.06 inch/hour)

*Landform:* Sedimentary plains and hills

*Parent material:* Semiconsolidated shale

*Slope range:* 2 to 15 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine, montmorillonitic, frigid  
Leptic Udic Haplusterts

### Typical Pedon

Abor silty clay loam, in an area of Abor-Yawdim silty clay loams, 4 to 15 percent slopes, in an area of rangeland, 1,600 feet south and 1,000 feet east of the northwest corner of sec. 6, T. 8 N., R. 57 E.

A—0 to 3 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak very fine granular structure; soft, very friable, moderately sticky, moderately plastic; many very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Bss—3 to 10 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; strong medium subangular blocky structure parting to strong fine subangular blocky; extremely hard, very firm, very sticky, very plastic; many very fine roots; few slickensides; disseminated lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bssk—10 to 17 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; moderate coarse and medium subangular blocky structure parting to moderate fine subangular blocky; extremely hard, very firm, very sticky, very plastic; many very fine roots; few slickensides; common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bky—17 to 29 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure; extremely hard, very firm, very sticky, very plastic; common very fine roots; few slickensides; few fine masses of lime and gypsum; violently effervescent; moderately alkaline; gradual wavy boundary.

Cr—29 to 60 inches; light brownish gray (2.5Y 6/2) semiconsolidated shale interbedded with thin discontinuous layers of sandstone that crushes to silty clay and silty clay loam, grayish brown (2.5Y 5/2) moist.

## Range in Characteristics

*Soil temperature:* 42 to 47 degrees F; summer temperatures: 60 to 72 degrees F

*Moisture control section:* Between 4 and 12 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees or higher.

*Depth to the Bssk horizon:* 10 to 16 inches

*Depth to the Cr horizon:* 20 to 40 inches

*Other features:* When dry, the soil has 1/4- to 2-inch cracks that extend to a depth of about 20 inches.

### A horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 1 to 4 (The 1 chroma are inherent from the parent material.)

Clay content: 35 to 40 percent

Content of rock fragments: 0 to 10 percent pebbles

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.4 to 8.4

*Bss horizon*

Hue: 10YR, 2.5Y, or 5Y  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 1 to 4  
 Texture: Silty clay, silty clay loam, or clay  
 Clay content: 35 to 60 percent  
 Electrical conductivity: 0 to 4 mmhos/cm  
 Slickenslides: Few to common  
 Reaction: pH 7.4 to 9.0

*Bssk horizon*

Hue: 5Y, 2.5Y, 10YR, or 2.5YR  
 Value: 5 to 7 dry; 4 or 5 moist  
 Chroma: 1 to 4  
 Texture: Silty clay, silty clay loam, or clay  
 Clay content: 35 to 60 percent  
 Electrical conductivity: 0 to 4 mmhos/cm  
 Calcium carbonate equivalent: 5 to 15 percent  
 Slickenslides: Few to common  
 Reaction: pH 7.4 to 9.0

*Bky horizon*

Hue: 5Y, 2.5Y, 10YR, or 2.5YR  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 1 to 4  
 Texture: Silty clay, silty clay loam, or clay  
 Clay content: 35 to 60 percent  
 Electrical conductivity: 0 to 4 mmhos/cm  
 Calcium carbonate equivalent: 5 to 15 percent  
 Gypsum: 1 to 5 percent  
 Reaction: pH 7.4 to 9.0

### **51C—Abor silty clay loam, 2 to 8 percent slopes**

#### **Setting**

*Landform:* Sedimentary plains  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Abor and similar soils: 85 percent

##### **Minor Components**

Marvan and similar soils: 0 to 5 percent  
 Neldore and similar soils: 0 to 5 percent  
 Soils with slopes more than 8 percent: 0 to 5 percent

#### **Major Component Description**

*Surface layer texture:* Silty clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **251D—Abor-Yawdim silty clay loams, 4 to 15 percent slopes**

#### **Setting**

*Landform:*

- Abor—Sedimentary plains and hills
- Yawdim—Sedimentary plains and hills

*Position on landform:*

- Abor—Backslopes
- Yawdim—Shoulders and summits

*Slope:*

- Abor—4 to 15 percent
- Yawdim—4 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Abor and similar soils: 60 percent  
 Yawdim and similar soils: 30 percent

##### **Minor Components**

Very shallow clayey soils: 0 to 4 percent  
 Marvan and similar soils: 0 to 3 percent  
 Soils with noncalcareous surface layers: 0 to 3 percent

#### **Major Component Description**

##### **Abor**

*Surface layer texture:* Silty clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.6 inches

**Yawdim***Surface layer texture:* Silty clay loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Semiconsolidated shale residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 2.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Absher Series***Depth class:* Very deep (>60 inches)*Drainage class:* Moderately well drained*Permeability:* Very slow (<0.06 inch/hour)*Landform:* Alluvial fans and stream terraces*Parent material:* Alluvium*Slope range:* 0 to 8 percent*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine, montmorillonitic Typic Natriboralfs

**Typical Pedon**

Absher clay loam in an area of Gerdrum-Absher complex, 2 to 8 percent slopes, in an area of rangeland, 1,000 feet north and 2,000 feet west of the southeast corner of sec. 26, T. 7 N., R. 58 E.

E—0 to 1 inches; light gray (2.5Y 7/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; weak very thin and thin platy structure parting to weak very fine granular; soft, very friable, nonsticky, nonplastic; few very fine roots; many very fine pores; slightly alkaline; abrupt smooth boundary.

Btn1—1 to 5 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong medium columnar structure parting to strong medium and fine subangular blocky; very hard, firm, moderately sticky, moderately plastic; many very fine roots; many very fine pores; common faint clay films on faces of peds and lining tubular interstitial pores; moderately alkaline; clear smooth boundary.

Btn2—5 to 11 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist;

strong medium prismatic structure parting to strong medium and fine subangular; extremely hard, very firm, very sticky, very plastic; common very fine roots; many very fine pores; common faint clay films on faces of peds and lining tubular interstitial pores; strongly alkaline; clear smooth boundary.

Btknyz—11 to 23 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; moderate medium prismatic structure parting to strong medium and fine subangular blocky; extremely hard, very firm, very sticky, very plastic; few very fine roots; many very fine pores; common faint clay films on faces of peds; common fine masses of lime; common very fine and fine crystals of gypsum and other salts; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bknyz—23 to 45 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; moderate medium and fine subangular blocky structure; extremely hard, very firm, very sticky, very plastic; few very fine roots; many very fine pores; common fine masses of lime; common very fine and fine crystals of gypsum and other salts; violently effervescent; strongly alkaline; gradual wavy boundary.

Bkzy—45 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; very hard, firm, moderately sticky, very plastic; common very fine pores; few fine masses of lime; common very fine and fine crystals of gypsum and other salts; strongly effervescent; strongly alkaline.

**Range in Characteristics**

*Soil temperature:* 42 to 47 degrees F; summer temperatures: 60 to 68 degrees

*Moisture control section:* Between 4 and 12 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher.

*Depth to the Btknyz horizon:* 6 to 11 inches

**E horizon**

Hue: 2.5Y, 10YR, or 7.5YR

Value: 6 or 7 dry; 3 to 5 moist

Chroma: 1 to 3

Texture: Loam, silt loam, or fine sandy loam (Where mixed with the Bt horizon, textures are mainly silty clay loam, clay loam, silty clay, clay, silt loam, or sandy clay loam.)

Clay content: 15 to 27 percent  
 Electrical conductivity: 4 to 8 mmhos/cm  
 Reaction: pH 6.6 to 8.4

***Btn horizons***

Hue: 2.5Y, 10YR, or 7.5YR  
 Value: 4 to 6 dry; 4 or 5 moist  
 Chroma: 1 to 3  
 Texture: Silty clay, clay, or clay loam  
 Clay content: 35 to 60 percent  
 Content of rock fragments: 0 to 15 percent pebbles  
 Electrical conductivity: 8 to 16 mmhos/cm  
 Sodium adsorption ratio: 18 to 70  
 Reaction: pH 6.6 to 8.4

***Btknyz horizon***

Hue: 2.5Y, 10YR, or 7.5YR  
 Value: 4 to 6 dry; 4 or 5 moist  
 Chroma: 2 or 3  
 Texture: Clay loam, clay, or silty clay  
 Clay content: 35 to 60 percent  
 Content of rock fragments: 0 to 15 percent pebbles  
 Calcium carbonate equivalent: 5 to 15 percent  
 Electrical conductivity: 8 to 16 mmhos/cm  
 Sodium adsorption ratio: 18 to 70  
 Gypsum: 1 to 5 percent  
 Reaction: pH 7.9 to 9.6

***Bknyz and Bkyz horizons***

Hue: 2.5Y, 10YR, or 7.5YR  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Texture: Clay loam, silty clay, clay, or silty clay loam  
 Clay content: 35 to 50 percent  
 Content of rock fragments: 0 to 15 percent pebbles  
 Calcium carbonate equivalent: 5 to 15 percent  
 Electrical conductivity: 16 to 30 mmhos/cm  
 Sodium adsorption ratio: 18 to 70  
 Gypsum: 1 to 5 percent  
 Reaction: pH 7.9 to 9.0

## **168B—Absher-Gerdrum complex, 0 to 4 percent slopes**

### **Setting**

***Landform:***

- Absher—Alluvial fans and stream terraces
- Gerdrum—Alluvial fans and stream terraces

***Slope:***

- Absher—0 to 4 percent
- Gerdrum—0 to 4 percent

*Mean annual precipitation:* 10 to 14 inches

### **Composition**

**Major Components**

Absher and similar soils: 60 percent  
 Gerdrum and similar soils: 30 percent

**Minor Components**

Creed and similar soils: 0 to 3 percent  
 Weingart and similar soils: 0 to 3 percent  
 Soils with slopes more than 4 percent: 0 to 2 percent  
 Ethridge and similar soils: 0 to 1 percent  
 Marvan and similar soils: 0 to 1 percent

### **Major Component Description**

**Absher**

*Surface layer texture:* Clay  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Moderately well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 4.5 inches

**Gerdrum**

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **Adger Series**

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained

*Permeability:* Very slow (<0.06 inch/hour)

*Landform:* Stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 8 percent

*Annual precipitation:* 15 to 19 inches

**Taxonomic Class:** Fine, montmorillonitic Leptic  
Natriborolls

### Typical Pedon

Adger silty clay loam, in an area of Daglum-Adger complex, 2 to 8 percent slopes, in an area of rangeland, 500 feet south and 50 feet west of the northeast corner of sec. 29, T. 9 N., R. 60 E.

- E—0 to 2 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 3/2) moist; moderate thin and very thin platy structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine roots; neutral; abrupt smooth boundary.
- Btn1—2 to 7 inches; brown (10YR 5/3) silty clay, very dark grayish brown (10YR 3/2) moist; strong coarse and medium prismatic structure; very hard, very firm, very sticky, very plastic; many very fine roots; few very fine tubular pores; many distinct clay films on faces of peds; moderately alkaline; clear wavy boundary.
- Btn2—7 to 11 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; extremely hard, extremely firm, very sticky, very plastic; many very fine roots; few very fine tubular pores; common faint clay films on faces of peds; moderately alkaline; clear wavy boundary.
- Byz—11 to 21 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; extremely hard, extremely firm, very sticky, very plastic; common very fine roots; common very fine tubular pores; common very fine and fine crystals of gypsum and other salts; moderately alkaline; clear wavy boundary.
- Bkyz—21 to 33 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; extremely hard, very firm, very sticky, very plastic; few very fine roots; common very fine tubular pores; common fine masses of lime; common very fine crystals of gypsum and other salts; slightly effervescent; moderately alkaline; gradual wavy boundary.
- Bkz—33 to 60 inches; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; massive; very hard, friable, moderately sticky, moderately plastic; many very fine tubular pores; common fine masses of lime; common very fine

crystals of salt; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches; moist in some part or all parts more than half the time during April through September.

*Thickness of the mollic epipedon:* 7 to 16 inches

*Depth to the Byz horizon:* 10 to 16 inches

*Depth to the Bkyz horizon:* 10 to 24 inches

#### E horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 3 to 5 moist

Texture: Silty clay loam mixed to 7 inches

(uncultivated areas have a thin A horizon that is a loam or silt loam)

Clay content: 18 to 27 percent

Electrical conductivity: 4 to 16 mmhos/cm

Reaction: pH 6.6 to 7.8

#### Btn1 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4 or 5 dry; 3 moist

Chroma: 2 to 4

Texture: Clay or silty clay

Clay content: 40 to 60 percent

Sodium adsorption ratio: 8 to 13

Electrical conductivity: 8 to 16 mmhos/cm

Reaction: pH 7.9 to 9.0

#### Btn2 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 to 4

Texture: Clay or silty clay

Clay content: 40 to 60 percent

Content of rock fragments: 0 to 15 percent—0 to

5 percent cobbles; 0 to 10 percent pebbles

Sodium adsorption ratio: 13 to 30

Electrical conductivity: 8 to 16 mmhos/cm

Reaction: pH 7.9 to 9.0

#### Byz horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Clay, silty clay, or clay loam

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 15 percent—0 to

5 percent cobbles; 0 to 10 percent pebbles

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 30

Gypsum: 1 to 5 percent  
Reaction: pH 7.9 to 9.0

*Bk<sub>yz</sub> and Bk<sub>z</sub> horizons*

Hue: 10YR, 2.5Y, or 5Y  
Value: 5 or 6 dry; 4 or 5 moist  
Chroma: 2 to 4  
Texture: Clay, silty clay, clay loam, or silty clay loam  
Clay content: 35 to 55 percent  
Content of rock fragments: 0 to 15 percent pebbles  
Calcium carbonate equivalent: 5 to 10 percent  
Electrical conductivity: 8 to 16 mmhos/cm  
Sodium adsorption ratio: 13 to 30  
Gypsum: 1 to 5 percent  
Reaction: pH 7.8 to 9.6

**Alona Series**

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)  
*Landform:* Alluvial fans and stream terraces  
*Parent material:* Alluvium  
*Slope range:* 2 to 8 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-silty, mixed, frigid Aridic Ustochrepts

**Typical Pedon**

Alona silt loam, 2 to 8 percent slopes, in an area of cropland, 450 feet south and 600 feet west of the northeast corner of sec. 7, T. 9 N., R. 56 E.

Ap—0 to 4 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; 1/2- to 1-inch vesicular crust over moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine roots; common very fine tubular pores; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bw—4 to 11 inches; light yellowish brown (2.5Y 6/4) silty clay loam, light olive brown (2.5Y 5/4) moist; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; common very fine roots; many very fine tubular pores; disseminated lime; violently effervescent; very strongly alkaline; clear smooth boundary.

Bk—11 to 18 inches; pale yellow (2.5Y 7/4) silty clay loam, light yellowish brown (2.5Y 6/4) moist;

moderate medium subangular blocky structure; hard, friable, moderately sticky, moderately plastic; few very fine roots; common very fine tubular pores; common very fine masses of lime; violently effervescent; very strongly alkaline; clear smooth boundary.

Bk<sub>z</sub>—18 to 60 inches; pale yellow (2.5Y 7/4) silty clay loam, light yellowish brown (2.5Y 6/4) moist; massive; hard, friable, moderately sticky, moderately plastic; few very fine roots; few very fine tubular pores; common medium and fine masses of lime and salt crystals; violently effervescent; very strongly alkaline.

**Range in Characteristics**

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher.

*Depth to the B<sub>k</sub> horizon:* 6 to 18 inches

*Ap horizon*

Hue: 10YR or 2.5Y  
Value: 5 or 6 dry; 3 to 5 moist  
Chroma: 2 or 3  
Clay content: 18 to 27 percent  
Electrical conductivity: 2 to 4 mmhos/cm  
Sodium adsorption ratio: 2 to 10  
Calcium carbonate equivalent: 5 to 10 percent  
Reaction: pH 7.4 to 8.4

*Bw horizon*

Hue: 10YR or 2.5Y  
Value: 5 or 6 dry; 3 to 5 moist  
Chroma: 2 to 4  
Texture: Silt loam or silty clay loam  
Clay content: 18 to 35 percent  
Electrical conductivity: 2 to 8 mmhos/cm  
Sodium adsorption ratio: 5 to 13  
Calcium carbonate equivalent: 5 to 10 percent  
Reaction: pH 8.5 to 9.6

*Bk horizon*

Hue: 10YR, 2.5Y, or 5Y  
Value: 6 or 7 dry; 4 to 6 moist  
Chroma: 2 to 4  
Texture: Silt loam or silty clay loam  
Clay content: 18 to 35 percent  
Effervescence: Strongly or violently  
Calcium carbonate equivalent: 5 to 10 percent  
Electrical conductivity: 2 to 8 mmhos/cm  
Sodium adsorption ratio: 13 to 40  
Reaction: pH 8.5 to 9.6

*Bkz horizon*

Hue: 10YR, 2.5Y, or 5Y  
 Value: 6 or 7 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Texture: Loam, silt loam, or silty clay loam  
 Clay content: 18 to 35 percent  
 Effervescence: Strongly or violently  
 Calcium carbonate equivalent: 5 to 15 percent  
 Electrical conductivity: 8 to 16 mmhos/cm  
 Sodium adsorption ratio: 13 to 40  
 Reaction: pH 9.1 to 9.6

## 20C—Alona silt loam, 2 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Alona and similar soils: 90 percent

#### Minor Components

Lonna and similar soils: 0 to 3 percent  
 Moderately deep loamy soils: 0 to 3 percent  
 Soils with darker-colored surface layers: 0 to 3 percent  
 Soils with slopes more than 8 percent: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 6.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Archin Series

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Permeability:* Slow (0.06 to 0.2 inch/hour)  
*Landform:* Alluvial fans, stream terraces, and sedimentary plains  
*Parent material:* Alluvium  
*Slope range:* 0 to 8 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-loamy, mixed Borollic Natrargids

### Typical Pedon

Archin fine sandy loam, in an area of Archin-Absher complex, 2 to 8 percent slopes, in an area of rangeland, 1,400 feet north and 850 feet east of the southwest corner of sec. 21, T. 5 N., R. 61 E.

- A—0 to 4 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure parting to weak fine granular; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine tubular pores; slightly acid; clear wavy boundary.
- E—4 to 6 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine roots; many very fine tubular pores; neutral; abrupt smooth boundary.
- Btn—6 to 13 inches; light yellowish brown (10YR 6/4) clay loam, brown (10YR 5/3) moist; strong coarse columnar structure parting to strong medium and fine subangular blocky; hard, friable, very sticky, moderately plastic; common very fine roots; many very fine tubular pores; many faint clay films on faces of peds; slightly alkaline; clear smooth boundary.
- Bky—13 to 19 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable, very sticky, moderately plastic; few very fine roots; many medium and fine masses of lime and gypsum crystals; moderately alkaline; clear smooth boundary.
- C1—19 to 29 inches; light gray (10YR 7/2) sandy clay loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, moderately sticky, slightly

plastic; few very fine roots; common medium and fine masses of lime; strongly alkaline; clear smooth boundary.

C2—29 to 60 inches; light brownish gray (10YR 6/2) sandy clay loam, grayish brown (10YR 5/2) moist; massive; soft, very friable, moderately sticky, slightly plastic; common fine masses of lime; strongly alkaline.

### Range in Characteristics

*Depth to the Bky horizon:* 10 to 20 inches

*Soil phases:* Gullied

*Taxonomic features:* The Archin soil is a taxadjunct to the series and classifies as fine-loamy, mixed Typic Natriboralfs. Use and management are similar.

*Other features:* Some pedons have a Bkz horizon.

#### A horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 1 to 4

Texture: Loam or fine sandy loam

Clay content: 10 to 25 percent

Reaction: pH 6.1 to 7.3

#### E horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 1 to 4

Texture: Loam or fine sandy loam

Clay content: 10 to 25 percent

Reaction: pH 6.1 to 7.3

#### Btn horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Loam, sandy clay loam, or clay loam

Clay content: 25 to 34 percent

Electrical conductivity: 0 to 4 mmhos/cm

Sodium adsorption ratio: 13 to 20

Reaction: pH 6.6 to 8.4

#### Bky horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 1 to 4

Texture: Sandy clay loam, loam, or clay loam

Clay content: 20 to 30 percent

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 13 to 20

Gypsum: 1 to 5 percent

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 9.0

#### C horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 1 to 4

Texture: Loam, clay loam, or sandy clay loam

Clay content: 15 to 30 percent

Electrical conductivity: 2 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 20

Reaction: pH 8.5 to 9.0

## 75A—Archin-Absher complex, 0 to 2 percent slopes

### Setting

#### Landform:

- Archin—Alluvial fans and stream terraces
- Absher—Alluvial fans and stream terraces

#### Slope:

- Archin—0 to 2 percent
- Absher—0 to 2 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Archin and similar soils: 50 percent

Absher and similar soils: 35 percent

#### Minor Components

Assinniboine and similar soils: 0 to 3 percent

Delpoint and similar soils: 0 to 3 percent

Soils with darker-colored surface layers: 0 to 3 percent

Soils with slopes more than 2 percent: 0 to 3 percent

Yamacall and similar soils: 0 to 2 percent

Alona and similar soils: 0 to 1 percent

### Major Component Description

#### Archin

*Surface layer texture:* Fine sandy loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 6.4 inches

#### Absher

*Surface layer texture:* Clay loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Moderately well drained

*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 4.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 75C—Archin-Absher complex, 2 to 8 percent slopes

### Setting

*Landform:*

- Archin—Alluvial fans and stream terraces
- Absher—Alluvial fans and stream terraces

*Slope:*

- Archin—2 to 8 percent
- Absher—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Archin and similar soils: 50 percent

Absher and similar soils: 35 percent

#### Minor Components

Assinniboine and similar soils: 0 to 3 percent

Delpoint and similar soils: 0 to 3 percent

Soils with darker-colored surface layers: 0 to 3 percent

Soils with slopes more than 8 percent: 0 to 3 percent

Yamacall and similar soils: 0 to 2 percent

Alona and similar soils: 0 to 1 percent

### Major Component Description

#### Archin

*Surface layer texture:* Fine sandy loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 6.4 inches

#### Absher

*Surface layer texture:* Clay loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Moderately well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 4.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 175A—Archin loam, 0 to 2 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 2 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Archin and similar soils: 85 percent

#### Minor Components

Delpoint and similar soils: 0 to 3 percent

Yamacall and similar soils: 0 to 3 percent

Soils with darker-colored surface layers: 0 to 3 percent

Soils with slopes more than 2 percent: 0 to 3 percent

Areas barren of vegetation: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 7.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 175C—Archin loam, 2 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Archin and similar soils: 85 percent

#### Minor Components

Delpoint and similar soils: 0 to 3 percent

Yamacall and similar soils: 0 to 3 percent

Soils with darker-colored surface layers: 0 to 3 percent

Soils with slopes more than 8 percent: 0 to 3 percent

Areas barren of vegetation: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 7.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 275D—Archin, gullied-Delpoint complex, 4 to 15 percent slopes

### Setting

*Landform:*

- Archin—Sedimentary plains and hills
- Delpoint—Sedimentary plains and hills

*Position on landform:*

- Archin—Backslopes and footslopes
- Delpoint—Shoulders and summits

*Slope:*

- Archin—4 to 8 percent
- Delpoint—4 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Archin and similar soils: 45 percent

Delpoint and similar soils: 40 percent

#### Minor Components

Lonna and similar soils: 0 to 3 percent

Soils with calcareous surface layers: 0 to 3 percent

Strongly sodic soils: 0 to 3 percent

Very shallow loamy soils: 0 to 3 percent

Yamacall and similar soils: 0 to 2 percent

Soils with slopes more than 15 percent: 0 to 1 percent

### Major Component Description

#### Archin

*Surface layer texture:* Fine sandy loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 6.4 inches

#### Delpoint

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 375C—Archin-Ynot complex, 2 to 8 percent slopes

### Setting

#### Landform:

- Archin—Alluvial fans and stream terraces
- Ynot—Alluvial fans and stream terraces

#### Slope:

- Archin—2 to 8 percent
- Ynot—2 to 8 percent

Mean annual precipitation: 10 to 14 inches

### Composition

#### Major Components

Archin and similar soils: 45 percent

Ynot and similar soils: 40 percent

#### Minor Components

Busby and similar soils: 0 to 3 percent

Delpoint and similar soils: 0 to 3 percent

Yamacall and similar soils: 0 to 3 percent

Very deep clayey soils: 0 to 3 percent

Strongly saline soils: 0 to 2 percent

Areas barren of vegetation: 0 to 1 percent

### Major Component Description

#### Archin

Surface layer texture: Fine sandy loam

Depth class: Very deep (>60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Salt affected: Saline within 30 inches

Sodium affected: Sodic within 30 inches

Available water capacity: Mainly 6.9 inches

#### Ynot

Surface layer texture: Sandy loam

Depth class: Very deep (>60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Assinniboine Series

Depth class: Very deep (>60 inches)

Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour)

Landform: Alluvial fans, stream terraces, and sedimentary plains

Parent material: Alluvium

Slope range: 0 to 15 percent

Annual precipitation: 10 to 14 inches

**Taxonomic Class:** Fine-loamy, mixed Aridic Argiborolls

### Typical Pedon

Assinniboine sandy clay loam, 2 to 8 percent slopes, in an area of rangeland, 2,400 feet north and 700 feet west of the southeast corner of sec. 12, T. 10 N., R. 58 E.

A—0 to 3 inches; grayish brown (10YR 5/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine roots; neutral; clear smooth boundary.

Bt1—3 to 8 inches; grayish brown (10YR 5/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky, slightly plastic; many very fine roots; many faint clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt2—8 to 16 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky, slightly plastic; common very fine roots; many faint clay films on faces of peds and in pores; slightly alkaline; clear smooth boundary.

Bt3—16 to 25 inches; light yellowish brown (2.5Y 6/4) fine sandy loam, olive brown (2.5Y 4/4) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common very fine roots; clay bridging between mineral grains; slightly alkaline; gradual smooth boundary.

Bk—25 to 60 inches; light yellowish brown (2.5Y 6/4) sandy loam, light olive brown (2.5Y 5/4) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few very fine roots; common fine masses of lime; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 43 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches; dry in some part more than 60 percent of the time from mid July through mid September.

*Thickness of the mollic epipedon:* 7 to 16 inches; may include all or part of the Bt horizons

*Depth to the Bk horizon:* 14 to 25 inches

*Other features:* In cultivated areas, a sandy clay loam texture results from mixing the A and Bt horizons. Some pedons have thin strata of loamy sand, loamy fine sand, or sand at depths below 40 inches.

#### A horizon

Hue: 10YR or 2.5Y

Chroma: 2 or 3

Texture: Sandy loam or sandy clay loam

Content of rock fragments: 0 to 15 percent pebbles

Clay content: 5 to 25 percent

Reaction: pH 6.1 to 7.8

#### Bt horizons

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture: Sandy clay loam or fine sandy loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bk horizon

Hue: 2.5Y or 10YR

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Sandy loam, fine sandy loam, or sandy clay loam

Clay content: 10 to 20 percent

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

### 74A—Assinniboine sandy clay loam, 0 to 2 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 2 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Assinniboine and similar soils: 85 percent

#### Minor Components

Chinook and similar soils: 0 to 4 percent

Marmarth and similar soils: 0 to 4 percent

Slightly saline soils: 0 to 4 percent

Moderately sodic soils: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Sandy clay loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 74C—Assinniboine sandy clay loam, 2 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

#### Major Components

Assinniboine and similar soils: 85 percent

#### Minor Components

Busby and similar soils: 0 to 3 percent

Chinook and similar soils: 0 to 4 percent

Marmarth and similar soils: 0 to 3 percent

Slightly saline soils: 0 to 3 percent

Moderately sodic soils: 0 to 2 percent

#### Major Component Description

*Surface layer texture:* Sandy clay loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 174C—Assinniboine-Ynot complex, 2 to 8 percent slopes

### Setting

*Landform:*

- Assinniboine—Sedimentary plains
- Ynot—Sedimentary plains

*Slope:*

- Assinniboine—2 to 8 percent
- Ynot—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Assinniboine and similar soils: 50 percent  
 Ynot and similar soils: 35 percent

#### Minor Components

Chinook and similar soils: 0 to 3 percent  
 Marmarth and similar soils: 0 to 3 percent  
 Areas of blowouts: 0 to 3 percent  
 Soils with lighter colored surface layers: 0 to 3 percent  
 Soils with slopes more than 8 percent: 0 to 2 percent  
 Slightly saline soils: 0 to 1 percent

### Major Component Description

#### Assinniboine

*Surface layer texture:* Sandy clay loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.5 inches

#### Ynot

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 13F—Badland

### Setting

*Landform:* Hills

*Slope:* 8 to 70 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Badland: 85 percent

#### Minor Components

Very shallow soils: 0 to 3 percent  
 Shallow soils: 0 to 3 percent  
 Moderately deep loamy soils: 0 to 3 percent  
 Very deep loamy soils: 0 to 3 percent  
 Very deep clayey soils: 0 to 3 percent

### Major Component Description

*Definition:* Badland is nearly barren or barren of vegetation and has numerous deeply entrenched, intermittent drainageways. It was formed by the active geologic erosion of soft, multicolored sedimentary beds that are mainly sandstone, siltstone, and shale.

*Surface layer texture:* Weathered bedrock

## 113F—Badland-Benz-Parchin complex, 0 to 70 percent slopes

### Setting

*Landform:*

- Badland—Hills
- Benz—Alluvial fans
- Parchin—Sedimentary plains

*Slope:*

- Badland—8 to 70 percent
- Benz—0 to 15 percent
- Parchin—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

## Composition

### Major Components

Badland: 40 percent  
Benz and similar soils: 30 percent  
Parchin and similar soils: 15 percent

### Minor Components

Delpoint and similar soils: 0 to 3 percent  
Busby and similar soils: 0 to 3 percent  
Very shallow loamy soils: 0 to 3 percent  
Cabbart and similar soils: 0 to 2 percent  
Nonsaline and nonsodic soils: 0 to 2 percent  
Yamacall and similar soils: 0 to 2 percent

## Major Component Description

### Badland

*Definition:* Badland is nearly barren or barren of vegetation and has numerous deeply entrenched, intermittent drainageways. It was formed by the active geologic erosion of soft, multicolored sedimentary beds that are mainly sandstone, siltstone, and shale.

*Surface layer texture:* Weathered bedrock

### Benz

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 6.7 inches

### Parchin

*Surface layer texture:* Fine sandy loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 3.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Barkof Series

*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Permeability:* Very slow (<0.06 inch/hour)  
*Landform:* Sedimentary plains and hills  
*Parent material:* Semiconsolidated shale  
*Slope range:* 2 to 15 percent  
*Annual precipitation:* 15 to 19 inches

**Taxonomic Class:** Fine, montmorillonitic, frigid  
Leptic Udic Haplusterts

## Typical Pedon

Barkof clay, in an area of Wayden-Barkof complex, 4 to 15 percent slopes, in an area of rangeland, 900 feet north and 1,000 feet east of the southwest corner of sec. 11, T. 10 N., R. 59 E.

A—0 to 4 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; strong very fine granular structure; very hard, firm, very sticky, very plastic; many very fine roots; neutral; clear smooth boundary.

Bss—4 to 17 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to strong medium subangular blocky; extremely hard, very firm, very sticky, very plastic; many very fine roots; continuous distinct slickensides; disseminated lime; strongly effervescent; strongly alkaline; gradual smooth boundary.

BC—17 to 27 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (10YR 4/2) moist; strong medium subangular blocky structure; extremely hard, very firm, very sticky, very plastic; common very fine roots; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Cr—27 to 60 inches; light grayish brown (2.5Y 6/2) semiconsolidated shale that crushes to silty clay loam, grayish brown (2.5Y 5/2) moist.

## Range in Characteristics

*Soil temperature:* 40 to 47 degrees F  
*Moisture control section:* Between 4 to 12 inches  
*Depth to the Cr horizon:* 20 to 40 inches  
*Other features:* In most years, this soil has 1/4- to 2-inch cracks that extend from the surface to 20 or 30 inches from late June through September. Intersecting slickensides and pressure faces are faint to prominent. A dry phase is recognized.

*A horizon*

Hue: 5Y, 2.5Y, or 10YR  
 Value: 4 or 5 dry; 4 or 5 moist  
 Chroma: 2 to 4  
 Clay content: 45 to 55 percent  
 Electrical conductivity: 0 to 2 mmhos/cm  
 Reaction: pH 6.6 to 8.4

*Bss horizon*

Hue: 5Y, 2.5Y, or 10YR  
 Value: 4 to 6 dry; 3 to 5 moist  
 Chroma: 2 to 4  
 Texture: Clay or silty clay  
 Clay content: 45 to 60 percent  
 Electrical conductivity: 2 to 4 mmhos/cm  
 Calcium carbonate equivalent: 5 to 10 percent  
 Reaction: pH 7.4 to 9.0

*BC horizon*

Hue: 5Y, 2.5Y, or 10YR  
 Value: 4 to 6 dry; 4 or 5 moist  
 Chroma: 2 to 4  
 Texture: Clay or silty clay  
 Clay content: 45 to 60 percent  
 Electrical conductivity: 2 to 4 mmhos/cm  
 Calcium carbonate equivalent: 5 to 10 percent  
 Reaction: pH 7.4 to 9.0

**27C—Barkof clay, 2 to 8 percent slopes****Setting**

*Landform:* Sedimentary plains  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 15 to 19 inches

**Composition****Major Components**

Barkof and similar soils: 85 percent

**Minor Components**

Wayden and similar soils: 0 to 4 percent  
 Very shallow clayey soils: 0 to 3 percent  
 Daglum and similar soils: 0 to 3 percent  
 Winifred and similar soils: 0 to 3 percent  
 Cambart and similar soils: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Clay  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

***Bascovy Series***

*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Permeability:* Very slow (<0.06 inch/hour)  
*Landform:* Sedimentary plains and hills  
*Parent material:* Semiconsolidated shale  
*Slope range:* 2 to 15 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine, montmorillonitic, frigid  
 Leptic Udic Haplusterts

**Typical Pedon**

Bascovy clay, in an area of Neldore-Bascovy clays, 4 to 15 percent slopes, in an area of rangeland, 5 feet south and 2,200 feet west of the northeast corner of sec. 10, T. 7 N., R. 59 E.

A—0 to 2 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; weak fine granular structure; hard, friable, moderately sticky, moderately plastic; many very fine and few fine roots; neutral; abrupt smooth boundary.

Bss—2 to 15 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; moderate coarse and medium subangular blocky structure; very hard, very firm, very sticky, very plastic; many very fine roots; common very fine tubular pores; common distinct slickensides; disseminated lime; slightly effervescent; moderately alkaline; clear smooth boundary.

Bssy—15 to 24 inches; gray (10YR 6/1) clay, gray (10YR 5/1) moist; weak coarse and medium subangular blocky structure; very hard, very firm, very sticky, very plastic; few very fine roots; common very fine pores; common distinct slickensides; many fine and very fine gypsum crystals; disseminated lime; slightly effervescent; moderately alkaline; gradual wavy boundary.

Cr—24 to 60 inches; gray (10YR 6/1) semiconsolidated shale that crushes to clay, gray (10YR 5/1) moist.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to the Cr horizon:* 20 to 40 inches

*Other features:* When dry, the soil has 1/4- to 2-inch cracks that extend to a depth of about 20 inches. The chroma of 1 is lithochromic. In cultivated areas, a clay texture results from mixing the A and Bss horizons.

#### A horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 1 to 3

Clay content: 35 to 60 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 6.6 to 8.4

#### Bss horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 1 to 3

Texture: Clay or silty clay

Clay content: 40 to 60 percent

Electrical conductivity: 2 to 4 mmhos/cm

Reaction: pH 6.1 to 8.4

#### Bssy horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 1 to 3

Texture: Clay or silty clay

Clay content: 40 to 60 percent

Gypsum: 1 to 5 percent

Electrical conductivity: 2 to 4 mmhos/cm

Reaction: pH 6.1 to 8.4

## 90C—Bascovy clay, 2 to 8 percent slopes

### Setting

*Landform:* Sedimentary plains

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Bascovy and similar soils: 85 percent

#### Minor Components

Neldore and similar soils: 0 to 3 percent

Marvan and similar soils: 0 to 3 percent

Orinoco and similar soils: 0 to 3 percent

Soils that are calcareous throughout: 0 to 2 percent

Soils with loam surface layers: 0 to 2 percent

Soils with silty clay loam surfaces: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Clay

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Benz Series

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Permeability:* Slow (0.06 to 0.2 inch/hour)

*Landform:* Alluvial fans and stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 15 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-loamy, mixed, (calcareous), frigid Aridic Ustorthents

### Typical Pedon

Benz clay loam, 2 to 8 percent slopes, in an area of rangeland, 1,500 feet south and 2,400 feet west of the northeast corner of sec. 27, T. 8 N., R. 61 E.

A—0 to 2 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; hard 1/4-inch surface crust; weak fine subangular blocky structure parting to moderate fine granular; hard, friable, moderately sticky, moderately plastic; many very fine roots; slightly alkaline; clear smooth boundary.

C1—2 to 16 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine roots; slightly effervescent, strongly alkaline; gradual wavy boundary.

- C2—16 to 32 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine roots; strongly effervescent, strongly alkaline; gradual wavy boundary.
- C3—32 to 60 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, moderately sticky, moderately plastic; few very fine roots; strongly effervescent; strongly alkaline.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F.

*Other features:* The C horizons may include stratifications of silt loam and sandy loam.

#### A horizon

Hue: 2.5Y or 10YR  
 Value: 5 to 7 dry; 3 to 5 moist  
 Chroma: 2 or 3  
 Clay content: 27 to 35 percent  
 Electrical conductivity: 4 to 8 mmhos/cm  
 Sodium adsorption ratio: 4 to 13  
 Reaction: pH 7.4 to 9.6

#### C horizons

Hue: 5Y, 2.5Y, or 10YR  
 Value: 5 to 8 dry; 4 to 6 moist  
 Chroma: 2 or 3  
 Texture: Loam or clay loam  
 Clay content: 18 to 35 percent  
 Electrical conductivity: 8 to 16 mmhos/cm  
 Sodium adsorption ratio: 13 to 30  
 Calcium carbonate equivalent: 1 to 5 percent  
 Gypsum content: 1 to 2 percent  
 Reaction: pH 8.5 to 9.6

## 11C—Benz clay loam, 2 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Benz and similar soils: 85 percent

#### Minor Components

Nonsaline and nonsodic soils: 0 to 3 percent  
 Very deep loam textured soils: 0 to 3 percent  
 Strongly saline soils: 0 to 3 percent  
 Moderately deep soils: 0 to 3 percent  
 Areas of blowouts: 0 to 2 percent  
 Areas with gullies: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Clay loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Blacksheep Series

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Permeability:* Moderately rapid (2.0 to 6.0 inches/hour)

*Landform:* Sedimentary plains and hills

*Parent material:* Semiconsolidated, sandy sedimentary beds

*Slope range:* 4 to 50 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Loamy, mixed, (calcareous), frigid, shallow Aridic Ustorthents

### Typical Pedon

Blacksheep fine sandy loam, in an area of Blacksheep-Twilight fine sandy loams, 15 to 45 percent slopes, in an area of rangeland, 300 feet south and 2,000 feet east of the northwest corner of sec. 12, T. 6 N., R. 58 E.

A—0 to 4 inches; brown (10YR 5/3) fine sandy loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, nonplastic; many very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk—4 to 17 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky, nonplastic; many very fine roots; common fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Cr—17 to 60 inches; light brownish gray (10YR 6/2) semiconsolidated, sandy sedimentary beds that crush to loamy sand; brown (10YR 5/3) moist.

### Range in Characteristics

*Soil temperature:* 44 to 47 degrees F

*Moisture control section:* Between 8 inches and the paralithic contact; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 5 degrees F or higher.

*Depth to the Cr horizon:* 10 to 20 inches

#### A horizon

Hue: 2.5Y, 10YR, or 7.5YR

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 15 percent

Reaction: pH 7.4 to 8.4

#### Bk horizon

Hue: 2.5Y, 10YR, or 7.5YR

Value: 5 to 7 dry; 5 or 6 moist

Chroma: 2 or 3

Texture: Very fine sandy loam, fine sandy loam, sandy loam, or loamy fine sand

Clay content: 5 to 15 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.9 to 8.4

## 55D—Blacksheep-Twilight fine sandy loams, 8 to 15 percent slopes

### Setting

#### *Landform:*

- Blacksheep—Hills
- Twilight—Hills

#### *Position on landform:*

- Blacksheep—Shoulders and summits
- Twilight—Backslopes and footslopes

#### *Slope:*

- Blacksheep—8 to 15 percent
- Twilight—8 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Blacksheep and similar soils: 45 percent

Twilight and similar soils: 45 percent

#### Minor Components

Areas of blowouts: 0 to 3 percent

Busby and similar soils: 0 to 2 percent

Very shallow loamy soils: 0 to 2 percent

Soils with slopes more than 15 percent: 0 to 1 percent

Delpoint and similar soils: 0 to 1 percent

Cambeth and similar soils: 0 to 1 percent

### Major Component Description

#### Blacksheep

*Surface layer texture:* Fine sandy loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.5 inches

#### Twilight

*Surface layer texture:* Fine sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 55E—Blacksheep-Twilight fine sandy loams, 15 to 45 percent slopes

### Setting

#### *Landform:*

- Blacksheep—Hills
- Twilight—Hills

*Position on landform:*

- Blacksheep—Shoulders and summits
- Twilight—Backslopes and footslopes

*Slope:*

- Blacksheep—15 to 45 percent
- Twilight—15 to 25 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Blacksheep and similar soils: 50 percent

Twilight and similar soils: 40 percent

#### Minor Components

Areas of blowouts: 0 to 2 percent

Very shallow loamy soils: 0 to 2 percent

Areas of rock outcrop: 0 to 2 percent

Soils with slopes less than 15 percent: 0 to 2 percent

Cabbart and similar soils: 0 to 1 percent

Busby and similar soils: 0 to 1 percent

### Major Component Description

#### Blacksheep

*Surface layer texture:* Fine sandy loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.5 inches

#### Twilight

*Surface layer texture:* Fine sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 155E—Blacksheep-Rock outcrop complex, 25 to 50 percent

### Setting

*Landform:*

- Blacksheep—Hills
- Rock outcrop—Hills

*Position on landform:*

- Blacksheep—Backslopes
- Rock outcrop—Shoulders and summits

*Slope:* 25 to 50 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Blacksheep and similar soils: 60 percent

Rock outcrop: 30 percent

#### Minor Components

Twilight and similar soils: 0 to 3 percent

Cabbart and similar soils: 0 to 2 percent

Areas of blowouts: 0 to 2 percent

Very shallow loamy soils: 0 to 1 percent

Soils with slopes less than 25 percent: 0 to 1 percent

Soils with slopes more than 50 percent: 0 to 1 percent

### Major Component Description

#### Blacksheep

*Surface layer texture:* Fine sandy loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.9 inches

#### Rock outcrop

*Definition:* Mainly sandstone bedrock.

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**Bonfri Series**

*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)  
*Landform:* Sedimentary plains and hills  
*Parent material:* Interbedded sandstone and shale  
*Slope range:* 2 to 15 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-loamy, mixed Typic  
 Eutroboralfs

**Typical Pedon**

Bonfri loam, 2 to 8 percent slopes, in an area of rangeland, 750 feet south and 750 feet east of the northwest corner of sec. 9, T. 8 N., R. 55 E.

A—0 to 4 inches; brown (10YR 5/3) loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure parting to moderate medium granular; soft, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine tubular pores; neutral; clear smooth boundary.

Bt—4 to 18 inches; brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to strong medium subangular blocky; slightly hard, friable, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; many faint clay films on faces of peds and in pores; slightly alkaline; clear wavy boundary.

Bk1—18 to 26 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; moderate medium prismatic structure parting to strong coarse and medium subangular blocky; hard, firm, slightly sticky, slightly plastic; many very fine roots; many very fine pores; violently effervescent; common fine masses of lime; moderately alkaline; gradual wavy boundary.

Bk2—26 to 32 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, firm, slightly sticky, slightly plastic; common very fine roots; common very fine tubular pores; many medium masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Cr—32 to 60 inches; light gray (10YR 7/1) interbedded sandstone and shale that crush to sandy loam, light brownish gray (10YR 6/2) moist.

**Range in Characteristics**

*Soil temperature:* 42 to 47 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Depth to the Bk horizon:* 18 to 30 inches  
*Depth to the Cr horizon:* 20 to 40 inches

**A horizon**

Hue: 10YR or 2.5Y  
 Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 or 3  
 Clay content: 18 to 27 percent  
 Content of rock fragments: 0 to 5 percent pebbles  
 Reaction: pH 6.6 to 7.3

**Bt horizon**

Hue: 10YR or 2.5Y  
 Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 or 3  
 Texture: Clay loam, silty clay loam, or sandy clay loam  
 Clay content: 27 to 35 percent  
 Sand content: Greater than 15 percent fine sand or coarser  
 Content of rock fragments: 0 to 5 percent pebbles  
 Reaction: pH 6.6 to 7.8

**Bk horizons**

Hue: 10YR or 2.5Y  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 or 3  
 Texture: Clay loam, loam, or sandy clay loam  
 Clay content: 20 to 32 percent  
 Content of rock fragments: 0 to 10 percent pebbles  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.4 to 8.4

**91C—Bonfri loam, 2 to 8 percent slopes****Setting**

*Landform:* Sedimentary plains  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Bonfri and similar soils: 85 percent

**Minor Components**

Delpoint and similar soils: 0 to 3 percent  
 Twilight and similar soils: 0 to 3 percent

Marmarth and similar soils: 0 to 3 percent  
 Moderately saline soils: 0 to 3 percent  
 Moderately sodic soils: 0 to 2 percent  
 Soils with slopes more than 8 percent: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone  
 and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 91D—Bonfri loam, 8 to 15 percent slopes

### Setting

*Landform:* Hills  
*Slope:* 8 to 15 percent  
*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Bonfri and similar soils: 85 percent

#### Minor Components

Twilight and similar soils: 0 to 4 percent  
 Delpoint and similar soils: 0 to 3 percent  
 Marmarth and similar soils: 0 to 3 percent  
 Moderately saline soils: 0 to 2 percent  
 Moderately sodic soils: 0 to 2 percent  
 Soils that are calcareous throughout: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone  
 and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 191C—Bonfri-Cambeth complex, 2 to 8 percent slopes

### Setting

*Landform:*  
 • Bonfri—Sedimentary plains  
 • Cambeth—Sedimentary plains  
*Slope:*  
 • Bonfri—2 to 8 percent  
 • Cambeth—2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Bonfri and similar soils: 50 percent  
 Cambeth and similar soils: 35 percent

#### Minor Components

Weingart and similar soils: 0 to 4 percent  
 Cabbart and similar soils: 0 to 3 percent  
 Yamacall and similar soils: 0 to 3 percent  
 Busby and similar soils: 0 to 2 percent  
 Soils with darker-colored surface layers: 0 to 2 percent  
 Soils with slopes more than 8 percent: 0 to 1 percent

### Major Component Description

#### Bonfri

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone  
 and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.0 inches

#### Cambeth

*Surface layer texture:* Silt loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy  
 sedimentary beds

*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 291D—Bonfri-Cabbart loams, 8 to 15 percent slopes

### Setting

*Landform:*

- Bonfri—Hills
- Cabbart—Hills

*Position on landform:*

- Bonfri—Backslopes and shoulders
- Cabbart—Shoulders and summits

*Slope:*

- Bonfri—8 to 15 percent
- Cabbart—8 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Bonfri and similar soils: 50 percent  
 Cabbart and similar soils: 35 percent

#### Minor Components

Delpoint and similar soils: 0 to 3 percent  
 Very shallow loamy soils: 0 to 3 percent  
 Marmarth and similar soils: 0 to 3 percent  
 Twilight and similar soils: 0 to 3 percent  
 Moderately saline soils: 0 to 2 percent  
 Soils with darker-colored surface layers: 0 to 1 percent

### Major Component Description

#### Bonfri

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.4 inches

#### Cabbart

*Surface layer texture:* Loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 391C—Bonfri-Parchin complex, 2 to 8 percent slopes

### Setting

*Landform:*

- Bonfri—Sedimentary plains
- Parchin—Sedimentary plains

*Slope:*

- Bonfri—2 to 8 percent
- Parchin—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Bonfri and similar soils: 45 percent  
 Parchin and similar soils: 40 percent

#### Minor Components

Weingart and similar soils: 0 to 3 percent  
 Cabbart and similar soils: 0 to 3 percent  
 Delpoint and similar soils: 0 to 3 percent  
 Very deep clayey soils: 0 to 3 percent  
 Strongly sodic soils: 0 to 2 percent  
 Soils with slopes more than 8 percent: 0 to 1 percent

### Major Component Description

#### Bonfri

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.4 inches

### **Parchin**

*Surface layer texture:* Fine sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 4.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **Bullock Series**

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Slow (0.06 to 0.2 inch/hour)

*Landform:* Sedimentary plains

*Parent material:* Interbedded sandstone and shale

*Slope range:* 2 to 8 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-loamy, mixed Borollic Natrargids

### **Typical Pedon**

Bullock clay loam, in an area of Parchin-Bullock complex, 2 to 8 percent slopes, in an area of rangeland, 1,700 feet north and 1,600 feet west of the southeast corner of sec. 27, T. 8 N., R. 57 E.

E—0 to 2 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure parting to single grain; soft, very friable, nonsticky, nonplastic; many very fine roots; slightly alkaline; abrupt smooth boundary.

Btn—2 to 10 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; strong medium columnar structure parting to moderate medium subangular blocky; very hard, very firm, very sticky, very plastic; many very fine roots; few

faint clay films on faces of peds; moderately alkaline; clear smooth boundary.

Bkz—10 to 25 inches; grayish brown (2.5Y 5/2) sandy clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; very hard, very firm, moderately sticky, moderately plastic; common very fine roots; few fine salt crystals; disseminated lime; few fine threads of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C—25 to 33 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, moderately sticky, moderately plastic; few very fine roots; few fine masses and seams of gypsum and other salts; disseminated lime; strongly effervescent; strongly alkaline; gradual wavy boundary.

Cr—33 to 60 inches; grayish brown (2.5Y 5/2) interbedded sandstone and shale that crushes to silty clay loam, dark grayish brown (2.5Y 4/2) moist.

### **Range in Characteristics**

*Depth to the Bkz horizon:* 10 to 15 inches

*Depth to the Cr horizon:* 20 to 40 inches

*Taxonomic features:* The Bullock soils are a taxadjunct to the series and classifies as fine-loamy, mixed Typic Natriboralfs. Use and management are similar.

*Other features:* In cultivated areas, a clay loam texture results from mixing the E and Btn horizons.

#### *E horizon*

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 3 or 4 moist

Chroma: 1 or 2

Texture: Clay loam mixed to 7 inches

(uncultivated areas have a thin A horizon that is a loam or silt loam)

Clay content: 5 to 10 percent

Reaction: pH 7.4 to 7.8

#### *Btn horizon*

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Clay loam or sandy clay loam

Clay content: 27 to 35 percent

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 13 to 30

Reaction: pH 7.8 to 9.6

#### *Bkz and C horizons*

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 1 to 4  
 Texture: Clay loam, sandy clay loam, or loam  
 Clay content: 25 to 32 percent  
 Electrical conductivity: 4 to 16 mmhos/cm  
 Sodium adsorption ratio: 20 to 40  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.8 to 9.6

### **Busby Series**

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately rapid (2.0 to 6.0 inches/hour)  
*Landform:* Alluvial fans, sedimentary plains, and hills  
*Parent material:* Alluvium  
*Slope range:* 2 to 15 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Coarse-loamy, mixed, frigid Aridic Ustochrepts

#### **Typical Pedon**

Busby fine sandy loam, 2 to 8 percent slopes, in an area of rangeland, 1,600 feet south and 1,900 feet west of the northeast corner of sec. 33, T. 5 N., R. 58 E.

A—0 to 4 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure parting to strong fine granular; soft, very friable, nonsticky, nonplastic; many very fine roots; slightly alkaline; gradual smooth boundary.

Bw—4 to 14 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure parting to strong fine granular; soft, very friable, nonsticky, nonplastic; many very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—14 to 24 inches; light yellowish brown (10YR 6/4) fine sandy loam, brown (10YR 5/3) moist; moderate medium and fine subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common very fine roots; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—24 to 60 inches; pale yellow (2.5Y 7/4) sandy loam, light olive brown (2.5Y 5/4) moist; strong fine granular structure; loose, nonsticky, nonplastic; few very fine roots; disseminated lime; few medium and fine masses of lime; violently effervescent; moderately alkaline.

#### **Range in Characteristics**

*Soil temperature:* 42 to 47 degrees F  
*Moisture control section:* Between 8 and 24 inches; dry in all parts between four-tenths and five-tenths of the cumulative days when the soil temperature at 20 inches is 41 degrees F or above.

*Depth to the Bk horizon:* 10 to 20 inches

*Soil phases:* Gullied

*Other features:* In some places, the upper 3 inches of soil have mollic colors, but, when mixed to 7 inches, the horizon does not meet the requirements for a mollic epipedon.

#### *A horizon*

Hue: 10YR or 2.5Y  
 Value: 5 or 6 dry; 3 or 4 moist  
 Chroma: 2 to 4  
 Texture: Fine sandy loam or sandy loam  
 Clay content: 10 to 18 percent  
 Reaction: pH 7.4 to 8.4

#### *Bw horizon*

Hue: 10YR or 2.5Y  
 Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 to 4  
 Texture: Fine sandy loam, sandy loam, or loam  
 Clay content: 10 to 18 percent  
 Reaction: pH 7.4 to 8.4

#### *Bk horizons*

Hue: 10YR, 2.5Y, or 5Y  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Texture: Fine sandy loam or sandy loam  
 Clay content: 3 to 18 percent  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.9 to 8.4

### **70C—Busby fine sandy loam, 2 to 8 percent slopes**

#### **Setting**

*Landform:* Alluvial fans  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Busby and similar soils: 85 percent

##### **Minor Components**

Twilight and similar soils: 0 to 3 percent  
 Yamacall and similar soils: 0 to 3 percent

Soils with darker-colored surface layers: 0 to 3 percent  
 Soils with slopes more than 8 percent: 0 to 3 percent  
 Lonna and similar soils: 0 to 2 percent  
 Delpoint and similar soils: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Fine sandy loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 70D—Busby fine sandy loam, 8 to 15 percent slopes

### Setting

*Landform:* Hills  
*Slope:* 8 to 15 percent  
*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Busby and similar soils: 85 percent

#### Minor Components

Yamacall and similar soils: 0 to 4 percent  
 Delpoint and similar soils: 0 to 3 percent  
 Twilight and similar soils: 0 to 3 percent  
 Soils that are calcareous throughout: 0 to 3 percent  
 Soils with darker-colored surface layers: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Fine sandy loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 170D—Busby-Blacksheep-Twilight fine sandy loams, 8 to 25 percent slopes

### Setting

*Landform:*

- Busby—Hills
- Blacksheep—Hills
- Twilight—Hills

*Position on landform:*

- Busby—Backslopes and footslopes
- Blacksheep—Shoulders and summits
- Twilight—Backslopes and footslopes

*Slope:*

- Busby—8 to 15 percent
- Blacksheep—8 to 25 percent
- Twilight—8 to 25 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Busby and similar soils: 45 percent  
 Blacksheep and similar soils: 30 percent  
 Twilight and similar soils: 15 percent

#### Minor Components

Very shallow loamy soils: 0 to 2 percent  
 Yamacall and similar soils: 0 to 2 percent  
 Delpoint and similar soils: 0 to 2 percent  
 Areas of blowouts: 0 to 2 percent  
 Areas of rock outcrop: 0 to 1 percent  
 Soils with darker-colored surface layers: 0 to 1 percent

### Major Component Description

#### Busby

*Surface layer texture:* Fine sandy loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.8 inches

**Blacksheep**

*Surface layer texture:* Fine sandy loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, sandy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.5 inches

**Twilight**

*Surface layer texture:* Fine sandy loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, sandy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**170E—Busby-Blacksheep-Rock outcrop complex, 8 to 25 percent slopes****Setting***Landform:*

- Busby—Hills
- Blacksheep—Hills
- Rock outcrop—Hills

*Position on landform:*

- Busby—Foothills and toeslopes
- Blacksheep—Shoulders and summits
- Rock outcrop—Summits

*Slope:*

- Busby—8 to 15 percent
- Blacksheep—8 to 25 percent

*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Busby and similar soils: 40 percent  
 Blacksheep and similar soils: 30 percent  
 Rock outcrop: 20 percent

**Minor Components**

Very shallow loamy soils: 0 to 2 percent  
 Delpoint and similar soils: 0 to 2 percent  
 Yamacall and similar soils: 0 to 2 percent  
 Areas of blowouts: 0 to 2 percent  
 Soils with darker-colored surface layers: 0 to 1 percent  
 Soils with slopes more than 25 percent: 0 to 1 percent

**Major Component Description****Busby**

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.2 inches

**Blacksheep**

*Surface layer texture:* Fine sandy loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, sandy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.5 inches

**Rock outcrop**

*Definition:* Mainly consolidated sandstone.

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**270E—Busby, gullied-Delpoint-Yawdim complex, 8 to 25 percent slopes****Setting***Landform:*

- Busby—Hills
- Delpoint—Hills
- Yawdim—Hills

*Position on landform:*

- Busby—Backslopes and footslopes
- Delpoint—Backslopes
- Yawdim—Shoulders and summits

*Slope:*

- Busby—8 to 15 percent
- Delpoint—8 to 25 percent
- Yawdim—8 to 25 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Busby and similar soils: 30 percent  
 Delpoint and similar soils: 30 percent  
 Yawdim and similar soils: 25 percent

#### Minor Components

Cabbart and similar soils: 0 to 3 percent  
 Yamacall and similar soils: 0 to 3 percent  
 Areas of rock outcrop: 0 to 3 percent  
 Slightly saline soils: 0 to 3 percent  
 Soils with slopes more than 25 percent: 0 to 2 percent  
 Poorly drained soils: 0 to 1 percent

### Major Component Description

#### Busby

*Surface layer texture:* Fine sandy loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.2 inches

#### Delpoint

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

#### Yawdim

*Surface layer texture:* Silty clay loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Cabba Series

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Permeability:* Moderate (0.6 to 2.0 inches/hour)

*Landform:* Sedimentary plains and hills

*Parent material:* Semiconsolidated, loamy sedimentary beds

*Slope range:* 2 to 45 percent

*Annual precipitation:* 15 to 19 inches

**Taxonomic Class:** Loamy, mixed, (calcareous), frigid, shallow Typic Ustorthents

### Typical Pedon

Cabba loam, in an area of Cabba-Cambert complex, 4 to 15 percent slopes, in an area of cropland, 700 feet south and 1,300 feet east of the northwest corner of sec. 12, T. 10 N., R. 59 E.

A—0 to 4 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

Bk1—4 to 9 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; few fine masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

Bk2—9 to 15 inches; pale yellow (2.5Y 7/4) loam, light olive brown (2.5Y 5/4) moist; weak fine subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few very fine roots; few fine masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

Cr—15 to 60 inches; light gray (2.5Y 7/2) semiconsolidated, loamy sedimentary beds that crush to loam; light brownish gray (2.5Y 6/2) moist.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 to 12 inches or

to the paralithic contact; frozen November through March; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees or higher.

*Depth to the Cr horizon:* 10 to 20 inches

*Soil phases:* Stony

*Other features:* The 1 chroma are lithochromic.

#### *A horizon*

Hue: 10YR or 2.5Y

Value: 3 to 6 dry; 3 or 4 moist

Chroma: 1 to 4

Clay content: 10 to 27 percent

Content of rock fragments: 0 to 20 percent—0 to 5 percent stones; 0 to 15 percent pebbles or channers

Electrical conductivity: 0 to 4 mmhos/cm

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 6.6 to 9.0

#### *Bk horizons*

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 8 dry; 4 to 7 moist

Chroma: 1 to 4 or 6

Texture: Loam, silt loam, clay loam, or silty clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles or channers

Calcium carbonate equivalent: 2 to 15 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.4 to 9.0

### **112D—Cabba-Cambert complex, 4 to 15 percent slopes**

#### **Setting**

##### *Landform:*

- Cabba—Sedimentary plains and hills
- Cambert—Sedimentary plains and hills

##### *Position on landform:*

- Cabba—Shoulders and summits
- Cambert—Backslopes

##### *Slope:*

- Cabba—4 to 15 percent
- Cambert—4 to 15 percent

*Mean annual precipitation:* 15 to 19 inches

#### **Composition**

##### **Major Components**

Cabba and similar soils: 60 percent

Cambert and similar soils: 30 percent

##### **Minor Components**

Farnuf and similar soils: 0 to 2 percent

Very shallow loamy soils: 0 to 2 percent

Soils with stony surface layers: 0 to 2 percent

Soils with slopes more than 15 percent: 0 to

2 percent

Soils with slopes less than 4 percent: 0 to 2 percent

#### **Major Component Description**

##### **Cabba**

*Surface layer texture:* Loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.5 inches

##### **Cambert**

*Surface layer texture:* Silt loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **312D—Cabba-Dast complex, 8 to 15 percent slopes**

#### **Setting**

##### *Landform:*

- Cabba—Hills
- Dast—Hills

##### *Position on landform:*

- Cabba—Shoulders and summits
- Dast—Backslopes

##### *Slope:*

- Cabba—8 to 15 percent
- Dast—8 to 15 percent

*Mean annual precipitation:* 15 to 19 inches

## Composition

### Major Components

Cabba and similar soils: 50 percent  
Dast and similar soils: 35 percent

### Minor Components

Cambert and similar soils: 0 to 4 percent  
Vebar and similar soils: 0 to 4 percent  
Soils with slopes more than 15 percent: 0 to 4 percent  
Soils with slopes less than 8 percent: 0 to 3 percent

## Major Component Description

### Cabba

*Surface layer texture:* Loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.0 inches

### Dast

*Surface layer texture:* Sandy loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, sandy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 412E—Cabba-Wayden complex, 8 to 45 percent slopes

## Setting

### *Landform:*

- Cabba—Hills
- Wayden—Hills

### *Position on landform:*

- Cabba—Backslopes
- Wayden—Shoulders and summits

### *Slope:*

- Cabba—8 to 45 percent
- Wayden—8 to 45 percent

*Mean annual precipitation:* 15 to 19 inches

## Composition

### Major Components

Cabba and similar soils: 60 percent  
Wayden and similar soils: 25 percent

### Minor Components

Winifred and similar soils: 0 to 4 percent  
Barkof and similar soils: 0 to 3 percent  
Very shallow loamy soils: 0 to 3 percent  
Very shallow clayey soils: 0 to 3 percent  
Areas of rock outcrop: 0 to 2 percent

## Major Component Description

### Cabba

*Surface layer texture:* Loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.0 inches

### Wayden

*Surface layer texture:* Stony silty clay loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 512E—Cabba-Dast complex, 15 to 25 percent slopes

## Setting

### *Landform:*

- Cabba—Hills
- Dast—Hills

*Position on landform:*

- Cabba—Shoulders and summits
- Dast—Backslopes and shoulders

*Slope:*

- Cabba—15 to 25 percent
- Dast—15 to 25 percent

*Mean annual precipitation:* 15 to 19 inches

### Composition

#### Major Components

Cabba and similar soils: 45 percent

Dast and similar soils: 40 percent

#### Minor Components

Very shallow loamy soils: 0 to 4 percent

Very deep loamy soils: 0 to 4 percent

Soils with slopes more than 25 percent: 0 to 4 percent

Wayden and similar soils: 0 to 3 percent

### Major Component Description

#### Cabba

*Surface layer texture:* Stony loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.0 inches

#### Dast

*Surface layer texture:* Sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Cabbart Series

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Permeability:* Moderate (0.6 to 2.0 inches/hour)

*Landform:* Sedimentary plains and hills

*Parent material:* Semiconsolidated, loamy sedimentary beds

*Slope range:* 2 to 70 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Loamy, mixed, (calcareous), frigid, shallow Aridic Ustochrepts

### Typical Pedon

Cabbart silt loam, in an area of Cabbart-Cambeth silt loams, 8 to 15 percent slopes, in an area of rangeland, 100 feet north and 250 feet east of the southwest corner of sec. 27, T. 7 N., R. 55 E.

A—0 to 3 inches; very pale brown (10YR 7/3) silt loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

Bk—3 to 12 inches; very pale brown (10YR 7/3) silt loam, dark brown (10YR 4/3) moist; weak very thin and thin platy structure; soft, very friable, slightly sticky, slightly plastic; common fine roots; many medium and fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Cr—12 to 60 inches; very pale brown (10YR 7/3) semiconsolidated, loamy sedimentary beds that crush to silt loam; yellowish brown (10YR 5/4) moist.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 to 12 inches or to the paralithic contact; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F.

*Depth to the Cr horizon:* 10 to 20 inches

#### A horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 2 to 4

Texture: Loam or silt loam

Clay content: 18 to 27 percent

Electrical conductivity: 0 to 4 mmhos/cm

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 9.0

#### Bk horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam, clay loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent

Electrical conductivity: 0 to 8 mmhos/cm

Sodium adsorption ratio: 1 to 5

Calcium carbonate equivalent: 10 to 25 percent

Reaction: pH 7.4 to 9.0

### **60D—Cabbart silt loam, 4 to 15 percent slopes**

#### **Setting**

*Landform:* Sedimentary plains and hills

*Slope:* 4 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Cabbart and similar soils: 85 percent

##### **Minor Components**

Very shallow loamy soils: 0 to 3 percent

Cambeth and similar soils: 0 to 3 percent

Soils with slopes more than 15 percent: 0 to 3 percent

Soils with slopes less than 4 percent: 0 to 3 percent

Areas of rock outcrop: 0 to 3 percent

#### **Major Component Description**

*Surface layer texture:* Silt loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **160E—Cabbart-Rock outcrop-Delpoint complex, 15 to 50 percent slopes**

#### **Setting**

*Landform:*

- Cabbart—Hills
- Rock outcrop—Hills
- Delpoint—Hills

*Position on landform:*

- Cabbart—Backslopes and footslopes
- Rock outcrop—Summits
- Delpoint—Backslopes

*Slope:*

- Cabbart—15 to 50 percent
- Delpoint—15 to 50 percent

*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Cabbart and similar soils: 50 percent

Rock outcrop: 20 percent

Delpoint and similar soils: 15 percent

##### **Minor Components**

Blacksheep and similar soils: 0 to 3 percent

Orinoco and similar soils: 0 to 3 percent

Yawdim and similar soils: 0 to 3 percent

Abor and similar soils: 0 to 3 percent

Soils with slopes less than 15 percent: 0 to 2 percent

Poorly drained soils: 0 to 1 percent

#### **Major Component Description**

##### **Cabbart**

*Surface layer texture:* Loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.6 inches

##### **Rock outcrop**

*Definition:* Mainly consolidated sedimentary beds.

**Delpoint**

*Surface layer texture:* Clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**160F—Cabbart-Rock outcrop-Yawdim complex, 15 to 70 percent slopes****Setting**

*Landform:*

- Cabbart—Hills
- Rock outcrop—Hills
- Yawdim—Hills

*Position on landform:*

- Cabbart—Backslopes and shoulders
- Rock outcrop—Summits
- Yawdim—Backslopes and footslopes

*Slope:*

- Cabbart—15 to 70 percent
- Yawdim—15 to 70 percent

*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Cabbart and similar soils: 35 percent

Rock outcrop: 25 percent

Yawdim and similar soils: 25 percent

**Minor Components**

Very shallow loamy soils: 0 to 4 percent

Abor and similar soils: 0 to 4 percent

Moderately sodic soils: 0 to 3 percent

Moderately saline soils: 0 to 2 percent

Soils with slopes less than 15 percent: 0 to 2 percent

**Major Component Description****Cabbart**

*Surface layer texture:* Loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.6 inches

**Rock outcrop**

*Definition:* Mainly consolidated sedimentary beds.

**Yawdim**

*Surface layer texture:* Silty clay loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**260D—Cabbart-Cambeth silt loams, 8 to 15 percent slopes****Setting**

*Landform:*

- Cabbart—Hills
- Cambeth—Hills

*Position on landform:*

- Cabbart—Shoulders and summits
- Cambeth—Backslopes

*Slope:*

- Cabbart—8 to 15 percent
- Cambeth—8 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Cabbart and similar soils: 50 percent

Cambeth and similar soils: 35 percent

**Minor Components**

Lonna and similar soils: 0 to 4 percent

Very shallow loamy soils: 0 to 4 percent

Yawdim and similar soils: 0 to 3 percent

Twilight and similar soils: 0 to 2 percent

Moderately saline soils: 0 to 1 percent  
Soils with slopes less than 8 percent: 0 to 1 percent

### Major Component Description

#### Cabbart

*Surface layer texture:* Silt loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.2 inches

#### Cambeth

*Surface layer texture:* Silt loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 360D—Cabbart-Bascovy complex, 4 to 15 percent slopes

### Setting

#### *Landform:*

- Cabbart—Sedimentary plains and hills
- Bascovy—Sedimentary plains and hills

#### *Position on landform:*

- Cabbart—Shoulders and summits
- Bascovy—Backslopes and footslopes

#### *Slope:*

- Cabbart—4 to 15 percent
- Bascovy—4 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Cabbart and similar soils: 50 percent  
Bascovy and similar soils: 35 percent

#### Minor Components

Delpoint and similar soils: 0 to 4 percent  
Marvan and similar soils: 0 to 4 percent  
Very shallow clayey soils: 0 to 4 percent  
Neldore and similar soils: 0 to 2 percent  
Very shallow loamy soils: 0 to 1 percent

### Major Component Description

#### Cabbart

*Surface layer texture:* Silt loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.2 inches

#### Bascovy

*Surface layer texture:* Clay  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Cambert Series

*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate (0.6 to 2.0 inches/hour)  
*Landform:* Sedimentary plains and hills  
*Parent material:* Semiconsolidated, loamy sedimentary beds  
*Slope range:* 2 to 15 percent  
*Annual precipitation:* 15 to 19 inches

**Taxonomic Class:** Fine-silty, mixed, frigid Typic Ustochrepts

### Typical Pedon

Cambert silt loam, in an area of Cabba-Cambert complex, 4 to 15 percent slopes, in an area of rangeland, 100 feet north and 250 feet west of the southeast corner of sec. 17, T. 10 N., R. 61 E.

A—0 to 3 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and few fine roots; neutral; clear smooth boundary.

Bw1—3 to 11 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and few fine roots; slightly alkaline; clear smooth boundary.

Bw2—11 to 15 inches; light gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; moderate medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and few fine roots; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk—15 to 25 inches; very pale brown (10YR 8/3) silt loam, pale brown (10YR 6/3) moist; moderate medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine roots; many fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Cr—25 to 60 inches; very pale brown (10YR 7/4) semiconsolidated, loamy sedimentary beds that crush to silt loam; light yellowish brown (10YR 6/4) moist.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to the Bk horizon:* 15 to 28 inches

*Depth to the Cr horizon:* 20 to 40 inches

#### A horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 7 dry; 3 to 6 moist

Chroma: 2 or 3

Clay content: 18 to 25 percent

Reaction: pH 6.6 to 8.4

#### Bw1 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam, silt loam, or silty clay loam (very fine sand makes up more than half of the sand fraction)

Clay content: 18 to 35 percent

Reaction: pH 7.4 to 8.4

#### Bw2 horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam, silt loam, or silty clay loam (very fine sand makes up more than half of the sand fraction)

Clay content: 18 to 35 percent

Reaction: pH 7.4 to 8.4

#### Bk horizon

Hue: 10YR or 2.5Y

Value: 6 to 8 dry; 4 to 6 moist

Chroma: 2 to 4 or 6

Texture: Loam, silt loam, or silty clay loam (very fine sand makes up more than half of the sand fraction)

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 10 to 30 percent

Reaction: pH 7.4 to 9.0

## 112C—Cambert-Cabba complex, 2 to 8 percent slopes

### Setting

#### Landform:

- Cambert—Sedimentary plains
- Cabba—Sedimentary plains

#### Position on landform:

- Cambert—Backslopes and shoulders
- Cabba—Shoulders and summits

#### Slope:

- Cambert—2 to 8 percent
- Cabba—2 to 8 percent

*Mean annual precipitation:* 15 to 19 inches

### Composition

#### Major Components

Cambert and similar soils: 50 percent

Cabba and similar soils: 35 percent

#### Minor Components

Farnuf and similar soils: 0 to 5 percent

Dast and similar soils: 0 to 4 percent

Soils with slopes more than 8 percent: 0 to 3 percent

Soils with stony surface layers: 0 to 2 percent

Soils with darker-colored surface layers: 0 to 1 percent

## Major Component Description

### Cambert

*Surface layer texture:* Silt loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

### Cabba

*Surface layer texture:* Loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Cambeth Series

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Moderate (0.6 to 2.0 inches/hour)

*Landform:* Sedimentary plains and hills

*Parent material:* Semiconsolidated, loamy sedimentary beds

*Slope range:* 2 to 25 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-silty, mixed, frigid Aridic Ustochrepts

## Typical Pedon

Cambeth silt loam, in an area of Cabbart-Cambeth silt loams, 8 to 15 percent slopes, in an area of rangeland, 2,000 feet south of the northeast corner (along roadway) of sec. 30, T. 9 N., R. 57 E.

A—0 to 3 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak fine and very fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; many fine tubular pores; slightly

effervescent; moderately alkaline; gradual wavy boundary.

Bw1—3 to 9 inches; pale olive (5Y 6/3) silt loam, olive (5Y 5/3) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, friable, moderately sticky, moderately plastic; common very fine roots; many fine tubular pores; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bw2—9 to 15 inches; grayish brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) moist; strong medium subangular blocky structure parting to moderate medium and fine subangular blocky; hard, friable, moderately sticky, moderately plastic; common very fine roots; many fine tubular pores; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk—15 to 38 inches; light gray (2.5Y 7/2) silt loam, light olive brown (2.5Y 5/4) moist; weak fine subangular blocky structure; hard, friable, moderately sticky, moderately plastic; few very fine roots; few fine tubular pores; many fine masses of lime; violently effervescent; strongly alkaline; gradual wavy boundary.

Cr—38 to 60 inches; white (10YR 8/1) semiconsolidated, loamy sedimentary beds that crush to silt loam, light gray (10YR 7/1) moist.

## Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Depth to the Bk horizon:* 10 to 15 inches

*Depth to the Cr horizon:* 20 to 40 inches

### A horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 to 4

Texture: Silt loam or loam

Clay content: 18 to 27 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

### Bw1 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Silt loam, loam, or silty clay loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

### Bw2 horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 to 4  
 Texture: Loam, silt loam, or silty clay loam  
 Clay content: 18 to 35 percent  
 Calcium carbonate equivalent: 5 to 10 percent  
 Reaction: pH 7.4 to 8.4

*Bk horizon*

Hue: 10YR, 2.5Y, or 5Y  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Texture: Loam, silt loam, or silty clay loam  
 Clay content: 18 to 35 percent  
 Calcium carbonate equivalent: 10 to 20 percent  
 Reaction: pH 7.9 to 9.0

### 60C—Cambeth silt loam, 2 to 8 percent slopes

#### Setting

*Landform:* Sedimentary plains  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Cambeth and similar soils: 85 percent

##### Minor Components

Cabbart and similar soils: 0 to 3 percent  
 Lonna and similar soils: 0 to 3 percent  
 Moderately saline soils: 0 to 3 percent  
 Soils with slopes more than 8 percent: 0 to 3 percent  
 Soils with darker-colored surface layers: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Silt loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 160D—Cambeth-Lonna silt loams, 8 to 15 percent slopes

#### Setting

*Landform:*

- Cambeth—Hills
- Lonna—Hills

*Position on landform:*

- Cambeth—Shoulders and summits
- Lonna—Backslopes and footslopes

*Slope:*

- Cambeth—8 to 15 percent
- Lonna—8 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Cambeth and similar soils: 55 percent  
 Lonna and similar soils: 30 percent

##### Minor Components

Cabbart and similar soils: 0 to 3 percent  
 Delpoint and similar soils: 0 to 3 percent  
 Yamacall and similar soils: 0 to 3 percent  
 Soils with slopes more than 15 percent: 0 to 3 percent  
 Orinoco and similar soils: 0 to 2 percent  
 Floweree and similar soils: 0 to 1 percent

#### Major Component Description

##### Cambeth

*Surface layer texture:* Silt loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.7 inches

##### Lonna

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 260C—Cambeth-Cabbart silt loams, 2 to 8 percent slopes

### Setting

#### *Landform:*

- Cambeth—Sedimentary plains
- Cabbart—Sedimentary plains

#### *Position on landform:*

- Cambeth—Backslopes and footslopes
- Cabbart—Shoulders and summits

#### *Slope:*

- Cambeth—2 to 8 percent
- Cabbart—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Cambeth and similar soils: 60 percent

Cabbart and similar soils: 25 percent

#### Minor Components

Lonna and similar soils: 0 to 4 percent

Very shallow loamy soils: 0 to 3 percent

Moderately saline soils: 0 to 3 percent

Soils with darker-colored surface layers: 0 to 3 percent

Soils with slopes more than 8 percent: 0 to 2 percent

### Major Component Description

#### Cambeth

*Surface layer texture:* Silt loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.7 inches

#### Cabbart

*Surface layer texture:* Silt loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 260E—Cambeth-Cabbart-Yawdim complex, 15 to 25 percent slopes

### Setting

#### *Landform:*

- Cambeth—Hills
- Cabbart—Hills
- Yawdim—Hills

#### *Position on landform:*

- Cambeth—Backslopes and shoulders
- Cabbart—Shoulders and summits
- Yawdim—Shoulders and summits

#### *Slope:*

- Cambeth—15 to 25 percent
- Cabbart—15 to 25 percent
- Yawdim—15 to 25 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Cambeth and similar soils: 40 percent

Cabbart and similar soils: 35 percent

Yawdim and similar soils: 15 percent

#### Minor Components

Delpoint and similar soils: 0 to 2 percent

Lonna and similar soils: 0 to 2 percent

Very shallow loamy soils: 0 to 2 percent

Soils with noncalcareous surface layers: 0 to 2 percent

Areas of rock outcrop: 0 to 1 percent

Soils with slopes more than 25 percent: 0 to 1 percent

### Major Component Description

#### Cambeth

*Surface layer texture:* Silt loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

**Cabbart**

*Surface layer texture:* Silt loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.6 inches

**Yawdim**

*Surface layer texture:* Silty clay loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Carfall Series**

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate (0.6 to 2.0 inches/hour)  
*Landform:* Alluvial fans and stream terraces  
*Parent material:* Alluvium  
*Slope range:* 2 to 15 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-loamy, mixed Pachic Argiborolls

**Typical Pedon**

Carfall loam, 2 to 8 percent slopes, in an area of rangeland, 1,400 feet north and 300 feet east of the southwest corner of sec. 10, T. 7 N., R. 60 E.

A1—0 to 7 inches; dark brown (10YR 4/3) loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; neutral; clear smooth boundary.

A2—7 to 15 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly

hard, friable, slightly sticky, slightly plastic; many very fine roots; neutral; clear smooth boundary.  
 Bt—15 to 32 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; strong coarse and medium prismatic structure parting to moderate medium subangular blocky; hard, firm, moderately sticky, moderately plastic; many very fine roots; many faint clay films on faces of peds and in pores; neutral; gradual smooth boundary.  
 BC—32 to 60 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, nonsticky, nonplastic; few very fine roots; neutral.

**Range in Characteristics**

*Soil temperature:* 42 to 47 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Thickness of the mollic epipedon:* 17 to 35 inches (includes part or all of the Bt horizon)  
*Depth to bedrock:* Greater than 60 inches

**A horizons**

Hue: 10YR or 2.5Y  
 Value: 4 or 5 dry; 2 or 3 moist  
 Chroma: 2 or 3  
 Clay content: 15 to 25 percent  
 Reaction: pH 6.1 to 7.3

**Bt horizon**

Hue: 10YR or 2.5Y  
 Value: 4 to 6 dry; 3 to 5 moist  
 Chroma: 2 to 4  
 Texture: Sandy clay loam, clay loam, or loam  
 Clay content: 20 to 35 percent  
 Reaction: pH 6.1 to 7.3

**BC horizon**

Hue: 10YR or 2.5Y  
 Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 to 4  
 Texture: Sandy loam or loamy sand  
 Clay content: 10 to 20 percent  
 Reaction: pH 6.1 to 7.3

**14C—Carfall loam, 2 to 8 percent slopes****Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Carfall and similar soils: 85 percent

**Minor Components**

Marmarth and similar soils: 0 to 3 percent  
 Assinniboine and similar soils: 0 to 3 percent  
 Very deep loam textured soils: 0 to 3 percent  
 Soils with lighter colored surface layers: 0 to 3 percent  
 Areas of blowouts: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**114C—Carfall-Assinniboine complex, 2 to 8 percent slopes****Setting**

*Landform:*  
 • Carfall—Alluvial fans  
 • Assinniboine—Alluvial fans  
*Slope:*  
 • Carfall—2 to 8 percent  
 • Assinniboine—2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Carfall and similar soils: 55 percent  
 Assinniboine and similar soils: 30 percent

**Minor Components**

Marmarth and similar soils: 0 to 4 percent  
 Twilight and similar soils: 0 to 4 percent  
 Chinook and similar soils: 0 to 4 percent  
 Soils with lighter colored surface layers: 0 to 3 percent

**Major Component Description****Carfall**

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.5 inches

**Assinniboine**

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**114D—Carfall-Assinniboine complex, 8 to 15 percent slopes****Setting**

*Landform:*  
 • Carfall—Alluvial fans  
 • Assinniboine—Alluvial fans  
*Slope:*  
 • Carfall—8 to 15 percent  
 • Assinniboine—8 to 15 percent  
*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Carfall and similar soils: 50 percent  
 Assinniboine and similar soils: 35 percent

**Minor Components**

Marmarth and similar soils: 0 to 4 percent  
 Twilight and similar soils: 0 to 3 percent  
 Chinook and similar soils: 0 to 3 percent  
 Soils with slopes more than 15 percent: 0 to 3 percent  
 Soils with lighter colored surface layers: 0 to 2 percent

**Major Component Description****Carfall**

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.5 inches

### **Assinniboine**

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **Chanta Series**

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate (0.6 to 2.0 inches/hour) in the upper 23 inches; rapid below this depth (6.0 to 20.0 inches/hour)  
*Landform:* Stream terraces  
*Parent material:* Loamy alluvium over sand and gravel  
*Slope range:* 0 to 8 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-loamy over sandy or sandy-skeletal, mixed Aridic Haploborolls

### **Typical Pedon**

Chanta loam, 0 to 2 percent slopes, in an area of cropland, 2,000 feet south and 1,200 feet east of the northwest corner of sec. 10, T. 8 N., R. 56 E.

Ap—0 to 5 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky, slightly plastic; many fine roots; neutral; clear smooth boundary.

Bw1—5 to 13 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; moderate coarse and medium subangular blocky structure; slightly hard, friable, moderately sticky,

moderately plastic; common fine roots; slightly alkaline; clear smooth boundary.

Bw2—13 to 18 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky, moderately plastic; few fine roots; slightly alkaline; clear smooth boundary.

Bk—18 to 23 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, moderately plastic; few fine roots; disseminated lime; few fine masses of lime; violently effervescent; strongly alkaline; abrupt smooth boundary.

2Ck—23 to 36 inches; light brownish gray (2.5Y 6/2) gravelly sand, grayish brown (2.5Y 5/2) moist; single grain; loose, nonsticky, nonplastic; 25 percent pebbles; pebbles coated with lime; violently effervescent; moderately alkaline; gradual wavy boundary.

2C—36 to 60 inches; grayish brown (2.5Y 5/2) gravelly sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose, nonsticky, nonplastic; 20 percent pebbles; disseminated lime; slightly effervescent; moderately alkaline.

### **Range in Characteristics**

*Thickness of the mollic epipedon:* 7 to 13 inches

*Depth to the Bk horizon:* 16 to 30 inches

*Depth to gravelly sand:* 20 to 30 inches

*Other features:* Some pedons do not have a Bk horizon.

#### *Ap horizon*

Value: 4 or 5 dry; 3 moist

Chroma: 2 or 3

Clay content: 15 to 25 percent

Reaction: pH 6.1 to 7.3

#### *Bw horizons*

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4

Clay content: 15 to 27 percent

Reaction: pH 6.6 to 7.8

#### *Bk horizon*

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 or 3

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

**2Ck horizon**

Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 or 3  
 Clay content: 0 to 5 percent  
 Content of rock fragments: 0 to 35 percent  
 pebbles  
 Calcium carbonate equivalent: 5 to 10 percent  
 Reaction: pH 7.9 to 9.0

**2C horizon**

Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 or 3  
 Clay content: 0 to 5 percent  
 Content of rock fragments: 15 to 50 percent  
 pebbles  
 Reaction: pH 7.9 to 9.0

**50A—Chanta loam, 0 to 2 percent slopes****Setting**

*Landform:* Stream terraces  
*Slope:* 0 to 2 percent  
*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Chanta and similar soils: 85 percent

**Minor Components**

Soils with slopes more than 2 percent: 0 to 3 percent  
 Moderately saline soils: 0 to 3 percent  
 Moderately sodic soils: 0 to 3 percent  
 Kremlin and similar soils: 0 to 3 percent  
 Very deep clay loam soils: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**50C—Chanta loam, 2 to 8 percent slopes****Setting**

*Landform:* Stream terraces  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Chanta and similar soils: 85 percent

**Minor Components**

Soils with slopes more than 8 percent: 0 to 3 percent  
 Soils with gravelly loam surface layers: 0 to 3 percent  
 Kremlin and similar soils: 0 to 3 percent  
 Very deep clay loam soils: 0 to 3 percent  
 Moderately saline soils: 0 to 2 percent  
 Moderately sodic soils: 0 to 1 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Chinook Series**

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately rapid (2.0 to 6.0 inches/hour)  
*Landform:* Alluvial fans and stream terraces  
*Parent material:* Alluvium  
*Slope range:* 0 to 15 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Coarse-loamy, mixed Aridic Haploborolls

### Typical Pedon

Chinook sandy loam, in an area of Chinook-Assinniboine complex, 2 to 8 percent slopes, in an area of cropland, 700 feet south and 900 feet east of the northwest corner of sec. 5, T. 4 N., R. 60 E.

Ap—0 to 6 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak medium and fine subangular blocky structure parting to weak fine granular; slightly hard, very friable, nonsticky, nonplastic; common very fine roots; neutral; gradual smooth boundary.

Bw1—6 to 12 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to moderate coarse subangular blocky; slightly hard, very friable, nonsticky, nonplastic; common very fine roots; slightly alkaline; gradual smooth boundary.

Bw2—12 to 18 inches; yellowish brown (10YR 5/4) sandy loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to moderate coarse subangular blocky; slightly hard, very friable, nonsticky, nonplastic; common very fine roots; slightly alkaline; gradual smooth boundary.

Bk1—18 to 28 inches; light yellowish brown (2.5Y 6/4) sandy loam, light olive brown (2.5Y 5/4) moist; weak coarse prismatic structure parting to moderate coarse subangular blocky; slightly hard, very friable, slightly sticky, slightly plastic; few very fine roots; few fine masses of lime; strongly effervescent; slightly alkaline; gradual smooth boundary.

Bk2—28 to 33 inches; pale brown (10YR 6/3) sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky, nonplastic; common fine masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

C—33 to 60 inches; light yellowish brown (2.5Y 6/4) sandy loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, very friable, nonsticky, nonplastic; slightly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 8 to 24 inches

*Thickness of the mollic epipedon:* 7- to 15-inches thick

*Depth to the Bk horizon:* 12 to 35 inches

### Ap horizon

Hue: 10YR or 2.5Y

Value: 2 or 3 moist

Chroma: 2 or 3

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 8.4

### Bw horizons

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent; more than 50 percent medium, fine, and coarser sand

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 8.4

### Bk1 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent; more than 50 percent medium, fine, and coarser sand

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 3 to 12 percent

Reaction: pH 7.4 to 8.4

### Bk2 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent; more than 50 percent medium, fine, and coarser sand

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

### C horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Fine sandy loam, sandy loam, loamy fine sand, or loamy sand

Clay content: 5 to 15 percent

Content of rock fragments: 0 to 15 percent  
pebbles  
Reaction: pH 7.4 to 8.4

### **83A—Chinook sandy loam, 0 to 2 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 2 percent  
*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Chinook and similar soils: 85 percent

##### **Minor Components**

Busby and similar soils: 0 to 3 percent  
Soils with slopes more than 2 percent: 0 to 3 percent  
Alona and similar soils: 0 to 3 percent  
Soils that are calcareous throughout: 0 to 3 percent  
Yamacall and similar soils: 0 to 2 percent  
Soils with sand and gravel substratums: 0 to  
1 percent

#### **Major Component Description**

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **83C—Chinook sandy loam, 2 to 8 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Chinook and similar soils: 85 percent

##### **Minor Components**

Busby and similar soils: 0 to 3 percent  
Soils with slopes more than 8 percent: 0 to 3 percent  
Alona and similar soils: 0 to 3 percent  
Soils that are calcareous throughout: 0 to 3 percent  
Yamacall and similar soils: 0 to 2 percent  
Soils with sand and gravel substratums: 0 to  
1 percent

#### **Major Component Description**

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **83D—Chinook sandy loam, 8 to 15 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 8 to 15 percent  
*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Chinook and similar soils: 85 percent

##### **Minor Components**

Twilight and similar soils: 0 to 4 percent  
Soils with gravelly surface layers: 0 to 3 percent  
Soils that are calcareous throughout: 0 to 3 percent  
Busby and similar soils: 0 to 3 percent  
Areas of blowouts: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 183C—Chinook-Assinniboine complex, 2 to 8 percent slopes

### Setting

*Landform:*

- Chinook—Alluvial fans and stream terraces
- Assinniboine—Alluvial fans and stream terraces

*Position on landform:*

- Chinook—Backslopes and shoulders
- Assinniboine—Backslopes and footslopes

*Slope:*

- Chinook—2 to 8 percent
- Assinniboine—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Chinook and similar soils: 45 percent  
 Assinniboine and similar soils: 40 percent

#### Minor Components

Marmarth and similar soils: 0 to 3 percent  
 Busby and similar soils: 0 to 3 percent  
 Areas of blowouts: 0 to 3 percent  
 Soils with gravelly surface layers: 0 to 3 percent  
 Soils with slopes more than 8 percent: 0 to 2 percent  
 Soils with darker-colored surface layers: 0 to 1 percent

### Major Component Description

#### Chinook

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.1 inches

#### Assinniboine

*Surface layer texture:* Sandy clay loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 283C—Chinook-Archin complex, 2 to 8 percent slopes

### Setting

*Landform:*

- Chinook—Alluvial fans and stream terraces
- Archin—Alluvial fans and stream terraces

*Position on landform:*

- Chinook—Backslopes and footslopes
- Archin—Toeslopes

*Slope:*

- Chinook—2 to 8 percent
- Archin—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Chinook and similar soils: 45 percent  
 Archin and similar soils: 40 percent

#### Minor Components

Marmarth and similar soils: 0 to 3 percent  
 Assinniboine and similar soils: 0 to 3 percent  
 Soils with slopes more than 8 percent: 0 to 3 percent  
 Moderately saline soils: 0 to 3 percent  
 Areas barren of vegetation: 0 to 2 percent  
 Soils with darker-colored surface layers: 0 to 1 percent

### Major Component Description

#### Chinook

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 8.1 inches

### **Archin**

*Surface layer texture:* Fine sandy loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 6.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **Cohagen Series**

*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately rapid (2.0 to 6.0 inches/hour)  
*Landform:* Sedimentary plains and hills  
*Parent material:* Semiconsolidated sandstone  
*Slope range:* 4 to 15 percent  
*Annual precipitation:* 15 to 19 inches

**Taxonomic Class:** Loamy, mixed, (calcareous), frigid, shallow Typic Ustorthents

### **Typical Pedon**

Cohagen fine sandy loam, in an area of Vebar-Cohagen fine sandy loams, 4 to 15 percent slopes, in an area of rangeland, 1,400 feet south and 2,400 feet west of the northeast corner sec. 8, T. 10 N., R. 61 E.

A—0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure parting to single grain; soft, very friable, nonsticky, nonplastic; many very fine and few fine roots; slightly effervescent; moderately alkaline; clear wavy boundary.

C1—5 to 10 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2)

moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; many very fine roots; 20 percent soft sandstone fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—10 to 15 inches; light gray (10YR 7/2) fine sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, nonsticky, nonplastic; common very fine roots; 50 percent soft sandstone fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cr—15 to 60 inches; light gray (10YR 7/2) semiconsolidated sandstone that crushes to fine sandy loam, grayish brown (10YR 5/2) moist.

### **Range in Characteristics**

*Depth to the Cr horizon:* 10 to 20 inches

#### *A horizon*

Hue: 10YR or 2.5Y  
 Value: 4 to 6 dry; 3 or 4 moist  
 Chroma: 2 to 4  
 Clay content: 10 to 18 percent  
 Content of rock fragments: 0 to 15 percent soft sandstone fragments  
 Reaction: pH 7.4 to 8.4

#### *C horizons*

Hue: 10YR or 2.5Y  
 Value: 5 to 7 dry; 4 or 5 moist  
 Chroma: 2 to 4  
 Clay content: 10 to 18 percent  
 Content of rock fragments: 0 to 50 percent soft sandstone fragments  
 Reaction: pH 7.4 to 8.4

### **Cooers Series**

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate (0.6 to 2.0 inches/hour)  
*Landform:* Hills  
*Parent material:* Alluvium  
*Slope range:* 8 to 35 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-loamy, mixed, frigid Aridic Ustochrepts

### **Typical Pedon**

Cooers loam, in an area of Cooers-Kirby-Rock outcrop complex, 8 to 25 percent slopes, in an area of rangeland, 200 feet south and 1,500 feet west of the northeast corner of sec. 14, T. 8 N., R. 57 E.

**A**—0 to 5 inches; brown (7.5YR 5/3) loam, dark brown (7.5YR 3/3) moist; moderate medium and fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; 5 percent channers; moderately alkaline; gradual wavy boundary.

**Bw**—5 to 11 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine roots; 10 percent channers; strongly effervescent; moderately alkaline; gradual wavy boundary.

**Bk1**—11 to 20 inches; pinkish gray (7.5YR 6/3) loam, brown (7.5YR 4/4) moist; weak medium and fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine roots; 10 percent channers; disseminated lime; violently effervescent; moderately alkaline; gradual wavy boundary.

**Bk2**—20 to 32 inches; pink (7.5YR 7/4) loam, strong brown (7.5YR 5/6) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; common very fine roots; 10 percent channers; many fine masses of lime; violently effervescent; strongly alkaline; gradual wavy boundary.

**BC**—32 to 60 inches; pink (7.5YR 7/4) loam, strong brown (7.5YR 5/6) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; 15 percent channers; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 44 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher.

*Depth to the Bk horizon:* 10 to 21 inches

#### *A horizon*

Hue: 2.5YR, 5YR, or 7.5YR

Value: 3 or 4 moist

Chroma: 3 or 4

Clay content: 18 to 25 percent

Content of rock fragments: 0 to 5 percent channers

Reaction: pH 6.6 to 8.4

#### *Bw horizon*

Hue: 2.5YR, 5YR, or 7.5YR

Value: 3 or 4 moist

Chroma: 4 or 6

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent hard channers

Reaction: pH 7.4 to 8.4

#### *Bk1 horizon*

Hue: 2.5YR, 5YR, or 7.5YR

Chroma: 3 or 4

Clay content: 18 to 27 percent

Content of rock fragments: 5 to 15 percent hard channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

#### *Bk2 horizon*

Hue: 2.5YR, 5YR, or 7.5YR

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Clay content: 18 to 27 percent

Content of rock fragments: 5 to 15 percent hard channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

#### *BC horizon*

Hue: 2.5YR, 5YR, or 7.5YR

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Texture: Loam, sandy loam, or fine sandy loam

Clay content: 10 to 27 percent

Content of rock fragments: 0 to 25 percent hard channers

Reaction: pH 7.9 to 9.0

## 8E—Cooers-Kirby-Rock outcrop complex, 8 to 25 percent slopes

### Setting

#### *Landform:*

- Cooers—Hills
- Kirby—Hills
- Rock outcrop—Hills

#### *Position on landform:*

- Cooers—Foothills
- Kirby—Backslopes and shoulders
- Rock outcrop—Shoulders and summits

#### *Slope:*

- Cooers—8 to 15 percent
- Kirby—8 to 25 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Cooers and similar soils: 35 percent

Kirby and similar soils: 35 percent

Rock outcrop: 15 percent

**Minor Components**

Moderately deep soils: 0 to 3 percent  
 Shallow soils: 0 to 3 percent  
 Moderately saline soils: 0 to 3 percent  
 Soils with slopes more than 25 percent: 0 to 2 percent  
 Soils with cobbly loam surface layers: 0 to 2 percent  
 Moderately sodic soils: 0 to 2 percent

**Major Component Description****Cooers**

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.5 inches

**Kirby**

*Surface layer texture:* Channery loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Material weathered from baked sandstone and shale  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.4 inches

**Rock outcrop**

*Definition:* Mainly scorio, consolidated shale, and consolidated sandstone.

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Creed Series**

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Permeability:* Slow (0.06 to 0.2 inch/hour)  
*Landform:* Alluvial fans and stream terraces  
*Parent material:* Alluvium  
*Slope range:* 0 to 8 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine, montmorillonitic Typic Natriboralfs

**Typical Pedon**

Creed loam, in an area of Creed-Absher complex, 2 to 8 percent slopes, in an area of rangeland, 200 feet north and 800 feet west of the southeast corner of sec. 9, T. 7 N., R. 60 E.

- A—0 to 4 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots and few fine roots; neutral; clear smooth boundary.
- E—4 to 7 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; weak thin platy structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots and few fine roots; many very fine tubular pores; neutral; clear smooth boundary.
- B<sub>tn</sub>—7 to 14 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; strong coarse and medium columnar structure parting to moderate medium subangular blocky; very hard, very firm, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; many distinct clay films on faces of peds and lining tubular pores; slightly alkaline; clear smooth boundary.
- B<sub>ky1</sub>—14 to 20 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, moderately sticky, moderately plastic; common very fine roots; common very fine tubular pores; common fine masses of lime; few fine gypsum crystals; violently effervescent; moderately alkaline; gradual wavy boundary.
- B<sub>ky2</sub>—20 to 30 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable, moderately sticky, moderately plastic; few very fine roots; common very fine tubular pores; common medium and fine masses of lime; few fine gypsum crystals; violently effervescent; moderately alkaline; gradual wavy boundary.
- B<sub>yz</sub>—30 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable, very sticky, moderately plastic; many medium and fine masses of

gypsum and other salts; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at 20 inches is 41 degrees F or above.

*Depth to the Bky horizon:* 10 to 20 inches

#### A horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 8.4

#### E horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 7 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 8.4

#### Btn horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture: Clay loam, silty clay loam, clay, or silty clay

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 15 percent pebbles

Electrical conductivity: 4 to 8 mmhos/cm

Sodium adsorption ratio: 8 to 13

Reaction: pH 6.6 to 9.0

#### Bky horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Silty clay loam, clay loam, sandy clay loam, loam, or clay

Content of rock fragments: 0 to 15 percent pebbles

Clay content: 27 to 45 percent

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 4 to 8 mmhos/cm

Sodium adsorption ratio: 13 to 20

Gypsum: 0 to 2 percent

Reaction: pH 7.9 to 9.0

#### Byz horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Loam, clay loam, or sandy clay loam that are thinly stratified or stratified with thin layers of coarser material; and silty clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Electrical conductivity: 4 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 25

Gypsum: 1 to 5 percent

Reaction: pH 7.9 to 9.0

## 54A—Creed loam, 0 to 2 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 2 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Creed and similar soils: 85 percent

#### Minor Components

Gerdrum and similar soils: 0 to 3 percent

Areas barren of vegetation: 0 to 3 percent

Weingart and similar soils: 0 to 3 percent

Soils with darker-colored surface layers: 0 to 3 percent

Nonsaline and nonsodic soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 6.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 54C—Creed loam, 2 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Creed and similar soils: 85 percent

##### Minor Components

Gerdrum and similar soils: 0 to 3 percent

Areas barren of vegetation: 0 to 3 percent

Weingart and similar soils: 0 to 3 percent

Soils with darker-colored surface layers: 0 to 2 percent

Nonsaline and nonsodic soils: 0 to 2 percent

Soils with slopes less than 2 percent: 0 to 2 percent

#### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 6.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 154C—Creed-Absher complex, 2 to 8 percent slopes

#### Setting

*Landform:*

- Creed—Alluvial fans and stream terraces

- Absher—Alluvial fans and stream terraces

*Slope:*

- Creed—2 to 8 percent

- Absher—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Creed and similar soils: 55 percent

Absher and similar soils: 30 percent

##### Minor Components

Gerdrum and similar soils: 0 to 4 percent

Marvan and similar soils: 0 to 4 percent

Soils with darker-colored surface layers: 0 to 4 percent

Weingart and similar soils: 0 to 3 percent

#### Major Component Description

##### Creed

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 6.6 inches

##### Absher

*Surface layer texture:* Clay

*Depth class:* Very deep (>60 inches)

*Drainage class:* Moderately well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 254C—Creed-Gerdrum complex, 2 to 8 percent slopes

### Setting

*Landform:*

- Creed—Alluvial fans and stream terraces
- Gerdrum—Alluvial fans and stream terraces

*Slope:*

- Creed—2 to 8 percent
- Gerdrum—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Creed and similar soils: 45 percent  
 Gerdrum and similar soils: 40 percent

#### Minor Components

Absher and similar soils: 0 to 3 percent  
 Weingart and similar soils: 0 to 3 percent  
 Very deep nonsaline soils: 0 to 3 percent  
 Marvan and similar soils: 0 to 3 percent  
 Areas barren of vegetation: 0 to 2 percent  
 Soils with darker-colored surface layers: 0 to 1 percent

### Major Component Description

#### Creed

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 6.7 inches

#### Gerdrum

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained

*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Daglum Series

*Depth class:* Deep or very deep (0 to 60 inches or more)

*Drainage class:* Well drained

*Permeability:* Slow (0.06 to 0.2 inch/hour)

*Landform:* Stream terraces and sedimentary plains

*Parent material:* Semiconsolidated shale and clayey alluvium

*Slope range:* 0 to 8 percent

*Annual precipitation:* 10 to 19 inches

**Taxonomic Class:** Fine, montmorillonitic Vertic Natriborolls

### Typical Pedon

Daglum loam, 2 to 8 percent slopes, in an area of rangeland, 1,100 feet north and 1,400 feet west of the southeast corner of sec. 13, T. 9 N., R. 59 E.

- A—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium platy structure parting to weak thin platy; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; slightly acid; clear smooth boundary.
- E—6 to 10 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak medium platy structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; slightly acid; abrupt smooth boundary.
- Btn—10 to 20 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; strong coarse and medium columnar structure parting to strong medium subangular blocky; extremely hard, very firm, very sticky, very plastic; many very fine roots; continuous distinct clay films on faces of peds and lining pores; moderately alkaline; clear smooth boundary.

Bz—20 to 27 inches; light gray (2.5Y 7/2) silty clay loam, dark grayish brown (2.5Y 5/2) moist; weak coarse and medium subangular blocky structure; very hard, firm, very sticky, very plastic; common very fine roots; common salt crystals; disseminated lime; slightly effervescent; moderately alkaline; gradual wavy boundary.

C—27 to 43 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, firm, very sticky, very plastic; few very fine roots; moderately alkaline; gradual wavy boundary.

Cr—43 to 60 inches; light gray (2.5Y 7/2) semiconsolidated shale that crushes to clay, light brownish gray (2.5Y 6/2) moist.

### Range in Characteristics

*Depth to the Cr horizon:* 40 to 60 inches or more

*Other features:* Pedons with sodium adsorption ratios of less than 13 have more exchangeable magnesium plus sodium than calcium plus exchangeable acidity at pH 8.2.

#### A horizon

Hue: 10YR

Value: 3 to 5 dry; 2 or 3 moist

Clay content: 18 to 26 percent

Reaction: pH 6.1 to 7.3

#### E horizon

Hue: 10YR or 2.5Y

Value: 4 to 7 dry; 3 to 5 moist

Chroma: 1 or 2

Clay content: 18 to 26 percent

Reaction: pH 6.1 to 7.3

#### Btn horizon

Hue: 10YR or 2.5Y

Value: 3 to 6 dry; 2 to 5 moist

Chroma: 2 or 3

Clay content: 35 to 60 percent

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 5 to 25

Reaction: pH 6.6 to 9.0

#### Bz horizon

Hue: 2.5Y or 5Y

Value: 5 to 7 dry; 3 to 6 moist

Chroma: 1 to 4

Clay content: 35 to 60 percent

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 20

Calcium carbonate equivalent: 1 to 15 percent

Reaction: pH 7.4 to 9.0

#### C horizon

Hue: 2.5Y or 5Y

Value: 5 to 7 dry; 3 to 6 moist

Chroma: 1 to 4

Clay content: 35 to 60 percent

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 20

Reaction: pH 7.4 to 9.0

## 45A—Daglum loam, 0 to 2 percent slopes

### Setting

*Landform:* Sedimentary plains

*Slope:* 0 to 2 percent

*Mean annual precipitation:* 15 to 19 inches

### Composition

#### Major Components

Daglum and similar soils: 85 percent

#### Minor Components

Adger and similar soils: 0 to 5 percent

Regent and similar soils: 0 to 3 percent

Savage and similar soils: 0 to 3 percent

Areas barren of vegetation: 0 to 2 percent

Farnuf and similar soils: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Deep (40 to 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 5.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**45C—Daglum loam, 2 to 8 percent slopes****Setting**

*Landform:* Sedimentary plains

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 15 to 19 inches

**Composition****Major Components**

Daglum and similar soils: 85 percent

**Minor Components**

Adger and similar soils: 0 to 5 percent

Regent and similar soils: 0 to 3 percent

Areas barren of vegetation: 0 to 3 percent

Savage and similar soils: 0 to 2 percent

Farnuf and similar soils: 0 to 1 percent

**Major Component Description**

*Surface layer texture:* Loam

*Depth class:* Deep (40 to 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 5.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**145A—Daglum-Adger complex,  
0 to 2 percent slopes****Setting**

*Landform:*

• Daglum—Stream terraces

• Adger—Stream terraces

*Slope:*

• Daglum—0 to 2 percent

• Adger—0 to 2 percent

*Mean annual precipitation:* 15 to 19 inches

**Composition****Major Components**

Daglum and similar soils: 45 percent

Adger and similar soils: 40 percent

**Minor Components**

Nonsaline and nonsodic soils: 0 to 4 percent

Moderately deep saline soils: 0 to 4 percent

Very deep strongly sodic soils: 0 to 3 percent

Moderately deep sodic soils: 0 to 3 percent

Poorly drained and ponded soils: 0 to 1 percent

**Major Component Description****Daglum**

*Surface layer texture:* Loam

*Depth class:* Deep (40 to 60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 5.7 inches

**Adger**

*Surface layer texture:* Silty clay loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 5.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**145C—Daglum-Adger complex,  
2 to 8 percent slopes****Setting**

*Landform:*

• Daglum—Stream terraces

• Adger—Stream terraces

*Slope:*

- Daglum—2 to 8 percent
- Adger—2 to 8 percent

*Mean annual precipitation:* 15 to 19 inches

### Composition

#### Major Components

Daglum and similar soils: 45 percent  
Adger and similar soils: 40 percent

#### Minor Components

Nonsaline and nonsodic soils: 0 to 5 percent  
Moderately deep saline soils: 0 to 4 percent  
Very deep strongly sodic soils: 0 to 3 percent  
Moderately deep sodic soils: 0 to 3 percent

### Major Component Description

#### Daglum

*Surface layer texture:* Loam  
*Depth class:* Deep (40 to 60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 5.7 inches

#### Adger

*Surface layer texture:* Silty clay loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 5.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 245A—Daglum loam, dry, 0 to 2 percent slopes

### Setting

*Landform:* Sedimentary plains  
*Slope:* 0 to 2 percent  
*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Daglum and similar soils: 85 percent

#### Minor Components

Very deep clayey soils: 0 to 3 percent  
Nonsaline and nonsodic soils: 0 to 3 percent  
Very deep strongly sodic soils: 0 to 3 percent  
Soils with lighter colored surface layers: 0 to 3 percent  
Soils with slopes more than 2 percent: 0 to 2 percent  
Areas barren of vegetation: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 7.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 245C—Daglum loam, dry, 2 to 8 percent slopes

### Setting

*Landform:* Sedimentary plains  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

## Composition

### Major Components

Daglum and similar soils: 85 percent

### Minor Components

Very deep clayey soils: 0 to 3 percent

Nonsaline and nonsodic soils: 0 to 3 percent

Very deep strongly sodic soils: 0 to 3 percent

Soils with lighter colored surface layers: 0 to 3 percent

Slopes less than 2 percent: 0 to 2 percent

Areas barren of vegetation: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 7.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Dast Series

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Moderately rapid (2.0 to 6.0 inches/hour)

*Landform:* Sedimentary plains and hills

*Parent material:* Semiconsolidated, sandy sedimentary beds

*Slope range:* 4 to 25 percent

*Annual precipitation:* 15 to 19 inches

**Taxonomic Class:** Coarse-loamy, mixed, frigid Typic Ustochrepts

### Typical Pedon

Dast sandy loam, in an area of Cabba-Dast complex, 8 to 15 percent slopes, in an area of rangeland, 1,000 feet north and 1,200 feet west of the southeast corner of sec. 12, T. 10 N., R. 59 E.

A—0 to 5 inches; brown (10YR 5/3) sandy loam, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine roots; slightly effervescent; slightly alkaline; clear smooth boundary.

Bw—5 to 12 inches; light brownish gray (2.5Y 6/2) sandy loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; soft, very friable, nonsticky, nonplastic; many very fine roots; disseminated lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk1—12 to 19 inches; light gray (2.5Y 6/3) sandy loam, light brownish gray (2.5Y 6/2) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine roots; few fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—19 to 34 inches; pale yellow (2.5Y 7/4) sandy loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; soft, very friable, nonsticky, nonplastic; common very fine roots; few fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Cr—34 to 60 inches; light gray (2.5Y 7/2) semiconsolidated, sandy sedimentary beds that crush to sandy loam; grayish brown (2.5Y 5/2) moist.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 8 and 24 inches

*Depth to the Bk horizon:* 12 to 24 inches

*Depth to bedrock:* 20 to 40 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 4 or 5 moist

Chroma: 2 to 4

Clay content: 2 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 7.4 to 8.4

#### Bw horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Fine sandy loam, sandy loam, or loam

Clay content: 2 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 7.4 to 8.4

**Bk horizons**

Hue: 10YR, 2.5Y, or 5Y  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Texture: Fine sandy loam, sandy loam, or loam  
 Clay content: 2 to 18 percent  
 Content of rock fragments: 0 to 15 percent pebbles  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.4 to 8.4

**Delpoint Series**

*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate (0.6 to 2.0 inches/hour)  
*Landform:* Sedimentary plains and hills  
*Parent material:* Semiconsolidated, loamy sedimentary beds  
*Slope range:* 2 to 50 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-loamy, mixed, frigid Aridic Ustochrepts

**Typical Pedon**

Delpoint loam, in an area of Delpoint-Cabbart complex, 2 to 8 percent slopes, in an area of rangeland, 2,400 feet south and 600 feet east of the northwest corner of sec. 10, T. 9 N., R. 56 E.

A—0 to 3 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many fine tubular pores; slightly alkaline; clear smooth boundary.

Bw—3 to 11 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate fine subangular blocky; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many fine tubular pores; slightly effervescent; slightly alkaline; clear smooth boundary.

Bk—11 to 28 inches; light gray (2.5Y 7/2) loam, light brownish gray (2.5Y 6/2) moist; weak coarse prismatic structure; hard, very friable, slightly sticky, moderately plastic; common very fine and fine roots; common fine tubular pores; disseminated lime; common fine masses and seams of lime; strongly effervescent; strongly alkaline; gradual smooth boundary.

Cr—28 to 60 inches; light gray (2.5Y 7/2) semiconsolidated, loamy sedimentary beds that crush to loam; light brownish gray (2.5Y 6/2) moist.

**Range in Characteristics**

*Soil temperature:* 42 to 47 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Depth to the Bk horizon:* 10 to 20 inches  
*Depth to the Cr horizon:* 20 to 40 inches

**A horizon**

Hue: 10YR or 2.5Y  
 Value: 5 or 6 dry; 3 to 5 moist  
 Chroma: 2 to 4  
 Texture: Loam or clay loam  
 Clay content: 20 to 35 percent  
 Content of rock fragments: 0 to 5 percent pebbles  
 Reaction: pH 6.6 to 8.4

**Bw horizon**

Hue: 10YR, 2.5Y, or 5Y  
 Value: 5 to 7 dry; 4 or 5 moist  
 Chroma: 2 to 4  
 Texture: Loam, clay loam, or silty clay loam  
 Clay content: 18 to 35 percent  
 Content of rock fragments: 0 to 15 percent pebbles  
 Reaction: pH 6.6 to 8.4

**Bk horizon**

Hue: 10YR, 2.5Y, or 5Y  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Texture: Loam, sandy loam, clay loam, or silty clay loam  
 Clay content: 18 to 35 percent  
 Content of rock fragments: 0 to 15 percent pebbles  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.9 to 9.0

**71C—Delpoint loam, 2 to 8 percent slopes****Setting**

*Landform:* Sedimentary plains  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Delpoint and similar soils: 85 percent

**Minor Components**

Yamacall and similar soils: 0 to 3 percent  
 Blacksheep and similar soils: 0 to 3 percent  
 Cabbart and similar soils: 0 to 3 percent  
 Marmarth and similar soils: 0 to 3 percent  
 Orinoco and similar soils: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**171C—Delpoint-Cabbart complex,  
2 to 8 percent slopes****Setting***Landform:*

- Delpoint—Sedimentary plains
- Cabbart—Sedimentary plains

*Position on landform:*

- Delpoint—Backslopes
- Cabbart—Shoulders and summits

*Slope:*

- Delpoint—2 to 8 percent
- Cabbart—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Delpoint and similar soils: 60 percent  
 Cabbart and similar soils: 30 percent

**Minor Components**

Yamacall and similar soils: 0 to 2 percent  
 Very shallow loamy soils: 0 to 2 percent  
 Moderately saline soils: 0 to 2 percent  
 Soils with slopes more than 8 percent: 0 to 2 percent  
 Soils with darker-colored surface layers: 0 to 2 percent

**Major Component Description****Delpoint**

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

**Cabbart**

*Surface layer texture:* Silt loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**171D—Delpoint-Cabbart complex,  
8 to 15 percent slopes****Setting***Landform:*

- Delpoint—Hills
- Cabbart—Hills

*Position on landform:*

- Delpoint—Backslopes
- Cabbart—Shoulders and summits

*Slope:*

- Delpoint—8 to 15 percent
- Cabbart—8 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Delpoint and similar soils: 50 percent  
 Cabbart and similar soils: 35 percent

**Minor Components**

Yamacall and similar soils: 0 to 3 percent  
 Very shallow loamy soils: 0 to 3 percent

Moderately saline soils: 0 to 3 percent  
 Soils with slopes more than 15 percent: 0 to 3 percent  
 Soils with darker-colored surface layers: 0 to 3 percent

### Major Component Description

#### Delpoint

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.4 inches

#### Cabbart

*Surface layer texture:* Silt loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 271D—Delpoint-Yamacall loams, 8 to 15 percent slopes

### Setting

#### *Landform:*

- Delpoint—Hills
- Yamacall—Hills

#### *Position on landform:*

- Delpoint—Backslopes and shoulders
- Yamacall—Backslopes and footslopes

#### *Slope:*

- Delpoint—8 to 15 percent
- Yamacall—8 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Delpoint and similar soils: 50 percent  
 Yamacall and similar soils: 35 percent

#### Minor Components

Cabbart and similar soils: 0 to 3 percent  
 Soils that are calcareous throughout: 0 to 3 percent  
 Moderately saline soils: 0 to 3 percent  
 Soils with slopes more than 15 percent: 0 to 3 percent  
 Soils with darker-colored surface layers: 0 to 3 percent

### Major Component Description

#### Delpoint

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

#### Yamacall

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 371E—Delpoint-Cooers-Kirby complex, 15 to 35 percent slopes

### Setting

#### *Landform:*

- Delpoint—Hills
- Cooers—Hills
- Kirby—Hills

*Position on landform:*

- Delpoint—Backslopes and footslopes
- Coopers—Footslopes
- Kirby—Shoulders and summits

*Slope:*

- Delpoint—15 to 35 percent
- Coopers—15 to 35 percent
- Kirby—15 to 35 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Delpoint and similar soils: 35 percent  
 Coopers and similar soils: 25 percent  
 Kirby and similar soils: 25 percent

#### Minor Components

Cabbart and similar soils: 0 to 4 percent  
 Yamacall and similar soils: 0 to 4 percent  
 Very shallow loamy soils: 0 to 2 percent  
 Areas of rock outcrop: 0 to 2 percent  
 Yawdim and similar soils: 0 to 2 percent  
 Soils with slopes more than 35 percent: 0 to 1 percent

### Major Component Description

#### Delpoint

*Surface layer texture:* Clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.8 inches

#### Coopers

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.6 inches

#### Kirby

*Surface layer texture:* Very channery loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Excessively drained  
*Dominant parent material:* Material weathered from baked sandstone and shale  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Eapa Series

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate (0.6 to 2.0 inches/hour)  
*Landform:* Alluvial fans and stream terraces  
*Parent material:* Alluvium  
*Slope range:* 0 to 15 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-loamy, mixed Aridic Argiborolls

### Typical Pedon

Eapa loam, 2 to 8 percent slopes, in an area of cropland, 950 feet north and 300 feet east of the southwest corner of sec. 10, T. 4 N., R. 61 E.

Ap—0 to 8 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; many fine tubular pores; neutral; clear smooth boundary.

Bt1—8 to 16 inches; pale brown (10YR 6/3) clay loam, dark grayish brown (10YR 4/2) moist; strong coarse prismatic structure parting to strong medium subangular blocky; hard, friable, moderately sticky, moderately plastic; many very fine roots; many fine tubular pores; common faint clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt2—16 to 24 inches; pale brown (10YR 6/3) clay loam, dark grayish brown (10YR 4/2) moist; strong medium prismatic structure parting to strong medium subangular blocky; hard, firm, very sticky, moderately plastic; common very fine roots; common very fine tubular pores; common faint clay films on faces of peds and in pores; slightly alkaline; clear smooth boundary.

Bk1—24 to 32 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; strong medium prismatic structure parting to moderate medium subangular blocky; hard, firm, very sticky, moderately plastic; few very fine roots; common very fine tubular pores; many medium

and fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—32 to 60 inches; gray (10YR 6/1) clay loam, gray (10YR 5/1) moist; weak coarse prismatic structure; hard, firm, very sticky, very plastic; few fine tubular pores; many medium and fine masses of lime; violently effervescent; strongly alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 7 to 16 inches

*Depth to the Bk horizon:* 15 to 30 inches

#### *Ap horizon*

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 20 to 30 percent

Reaction: pH 6.6 to 7.8

#### *Bt horizons*

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 to 4

Texture: Clay loam or loam

Clay content: 24 to 34 percent

Reaction: pH 6.6 to 7.8

#### *Bk horizons*

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 5 moist

Chroma: 1 to 4

Texture: Loam, clay loam, or sandy clay loam

Clay content: 18 to 30 percent

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 9.0

## 84A—Eapa loam, 0 to 2 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 2 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Eapa and similar soils: 85 percent

#### Minor Components

Yamacall and similar soils: 0 to 3 percent

Soils with lighter colored surface layers: 0 to 3 percent

Alona and similar soils: 0 to 3 percent

Soils with slopes more than 2 percent: 0 to 3 percent

Very deep clayey soils: 0 to 2 percent

Areas barren of vegetation: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 11.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 84C—Eapa loam, 2 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Eapa and similar soils: 85 percent

#### Minor Components

Yamacall and similar soils: 0 to 3 percent

Soils with lighter colored surface layers: 0 to 3 percent

Alona and similar soils: 0 to 3 percent

Soils with slopes more than 8 percent: 0 to 3 percent

Very deep clayey soils: 0 to 2 percent

Areas barren of vegetation: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 11.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 84D—Eapa loam, 8 to 15 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 8 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Eapa and similar soils: 85 percent

#### Minor Components

Soils with lighter colored surface layers: 0 to 4 percent

Alona and similar soils: 0 to 4 percent

Delpoint and similar soils: 0 to 4 percent

Soils with slopes less than 8 percent: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 11.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 167C—Eapa-Yamacall loams, 2 to 8 percent slopes

### Setting

*Landform:*

- Eapa—Alluvial fans and stream terraces
- Yamacall—Alluvial fans and stream terraces

*Position on landform:*

- Eapa—Backslopes and footslopes
- Yamacall—Backslopes

*Slope:*

- Eapa—2 to 8 percent
- Yamacall—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Eapa and similar soils: 45 percent

Yamacall and similar soils: 40 percent

#### Minor Components

Delpoint and similar soils: 0 to 4 percent

Lonna and similar soils: 0 to 3 percent

Soils that are calcareous throughout: 0 to 3 percent

Soils with slopes more than 8 percent: 0 to 3 percent

Marvan and similar soils: 0 to 2 percent

### Major Component Description

#### Eapa

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 11.1 inches

#### Yamacall

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Ethridge Series

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Permeability:* Slow (0.06 to 0.2 inch/hour)

*Landform:* Alluvial fans, stream terraces, sedimentary plains, and hills

*Parent material:* Alluvium

*Slope range:* 0 to 15 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine, montmorillonitic Aridic  
 Argiborolls

### Typical Pedon

Ethridge silty clay loam, 0 to 2 percent slopes, in an area of cropland, 1,400 feet north and 1,500 feet east of the southwest corner of sec. 12, T. 9 N., R. 56 E.

Ap—0 to 5 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 3/3) moist; strong fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; many very fine irregular pores; neutral; abrupt smooth boundary.

Bt—5 to 12 inches; brown (10YR 5/3) silty clay, dark brown (10YR 3/3) moist; strong medium subangular blocky structure parting to strong fine angular blocky; hard, firm, moderately sticky, moderately plastic; few very fine roots; common very fine tubular pores; continuous distinct clay films on faces of ped; common faint clay films lining tubular pores; slightly alkaline; clear wavy boundary.

Bk—12 to 27 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; many very fine tubular pores; common fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bky—27 to 38 inches; very pale brown (10YR 7/3) silty clay loam, brown (10YR 5/3) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; many very fine tubular and common medium tubular pores; common fine masses of lime; few fine crystals of gypsum; violently effervescent; moderately alkaline; clear wavy boundary.

BC—38 to 60 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable, slightly sticky, slightly plastic; few very fine roots; common very fine tubular pores; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F  
*Moisture control section:* Between 4 and 12 inches

*Thickness of the mollic epipedon:* 7 to 14 inches; may include all or part of the Bt horizon  
*Depth to the Bk horizon:* 10 to 20 inches

#### Ap horizon

Hue: 10YR or 2.5Y  
 Value: 2 or 3 moist  
 Chroma: 2 or 3  
 Texture: Silty clay loam or loam  
 Clay content: 20 to 35 percent  
 Content of rock fragments: 0 to 5 percent pebbles  
 Reaction: pH 6.1 to 7.8

#### Bt horizon

Hue: 10YR or 2.5Y  
 Value: 3 or 4 moist  
 Chroma: 2 to 4  
 Texture: Clay, silty clay, clay loam, or silty clay loam  
 Clay content: 35 to 45 percent  
 Content of rock fragments: 0 to 5 percent pebbles  
 Reaction: pH 6.6 to 8.4

#### Bk horizon

Hue: 10YR or 2.5Y  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Texture: Clay, silty clay loam, loam, clay loam, or silty clay  
 Clay content: 30 to 45 percent  
 Content of rock fragments: 0 to 5 percent pebbles  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.4 to 9.0

#### Bky horizon

Hue: 10YR or 2.5Y  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Texture: Clay loam, silt loam, loam, or silty clay loam  
 Clay content: 25 to 40 percent  
 Content of rock fragments: 0 to 5 percent pebbles  
 Electrical conductivity: 0 to 4 mmhos/cm  
 Calcium carbonate equivalent: 5 to 15 percent  
 Gypsum: 1 to 3 percent  
 Reaction: pH 7.4 to 9.0

#### BC horizon

Hue: 10YR or 2.5Y  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Texture: Clay loam, silt loam, or silty clay loam  
 Clay content: 25 to 40 percent

Content of rock fragments: 0 to 5 percent pebbles  
 Electrical conductivity: 0 to 4 mmhos/cm  
 Gypsum: 1 to 3 percent  
 Reaction: pH 7.4 to 9.0

### **85A—Ethridge silty clay loam, 0 to 2 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 2 percent  
*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Ethridge and similar soils: 85 percent

##### **Minor Components**

Alona and similar soils: 0 to 4 percent  
 Soils with slopes more than 2 percent: 0 to 4 percent  
 Soils with darker-colored surface layers: 0 to 3 percent  
 Soils with loam surface layers: 0 to 3 percent  
 Soils with clay loam surface layers: 0 to 1 percent

#### **Major Component Description**

*Surface layer texture:* Silty clay loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **85C—Ethridge silty clay loam, 2 to 8 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Ethridge and similar soils: 85 percent

##### **Minor Components**

Alona and similar soils: 0 to 3 percent  
 Soils with slopes more than 8 percent: 0 to 3 percent  
 Soils with darker-colored surface layers: 0 to 3 percent  
 Soils with loam surface layers: 0 to 3 percent  
 Soils with clay loam surface layers: 0 to 2 percent  
 Delpoint and similar soils: 0 to 1 percent

#### **Major Component Description**

*Surface layer texture:* Silty clay loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **166C—Ethridge loam, 2 to 8 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Ethridge and similar soils: 85 percent

##### **Minor Components**

Eapa and similar soils: 0 to 4 percent  
 Gerdrum and similar soils: 0 to 3 percent  
 Soils with slopes more than 8 percent: 0 to 3 percent  
 Abor and similar soils with clay loam surface layers: 0 to 3 percent  
 Creed and similar soils: 0 to 1 percent  
 Floweree and similar soils: 0 to 1 percent

## Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Farnuf Series

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate (0.6 to 2.0 inches/hour)  
*Landform:* Alluvial fans and stream terraces  
*Parent material:* Alluvium  
*Slope range:* 0 to 8 percent  
*Annual precipitation:* 15 to 19 inches

**Taxonomic Class:** Fine-loamy, mixed Typic Argiborolls

## Typical Pedon

Farnuf loam, 2 to 8 percent slopes, in an area of cropland, 1,400 feet north and 1,200 feet west of the southeast corner of sec. 30, T. 10 N., R. 60 E.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine roots; slightly alkaline; abrupt smooth boundary.

Bt—5 to 13 inches; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; strong coarse and medium prismatic structure parting to strong medium subangular blocky; hard, firm, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; common faint clay films on faces of peds and lining tubular pores; slightly alkaline; clear smooth boundary.

Bk1—13 to 27 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; common very fine roots; many very fine tubular pores;

common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—27 to 60 inches; light gray (10YR 7/2) silt loam, light brownish gray (10YR 6/2) moist; weak coarse prismatic structure; hard, firm, moderately sticky, moderately plastic; few very fine roots; common very fine pores; common fine masses of lime; strongly effervescent; moderately alkaline.

## Range in Characteristics

*Soil temperature:* 41 to 47 degrees F  
*Moisture control section:* Between 4 and 12 inches  
*Thickness of the mollic epipedon:* 7 to 15 inches; includes all or only part of the argillic horizon  
*Depth to the Bk horizon:* 10 to 25 inches

### Ap horizon

Hue: 2.5Y or 10YR  
 Value: 3 to 5 dry; 2 or 3 moist  
 Chroma: 2 or 3  
 Clay content: 15 to 27 percent  
 Content of rock fragments: 0 to 15 percent pebbles  
 Reaction: pH 6.1 to 7.8

### Bt horizon

Hue: 2.5Y, 10YR, or 7.5YR  
 Value: 3 to 6 dry; 2 to 4 moist  
 Chroma: 2 to 4  
 Texture: Loam, clay loam, or silty clay loam  
 Clay content: 25 to 35 percent  
 Content of rock fragments: 0 to 15 percent pebbles  
 Reaction: pH 6.1 to 7.8

### Bk horizons

Hue: 2.5Y, 10YR, or 7.5YR  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Texture: Fine sandy loam, loam, silt loam, silty clay loam, or clay loam  
 Clay content: 20 to 30 percent  
 Content of rock fragments: 0 to 15 percent pebbles  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.4 to 8.4

## 35A—Farnuf loam, 0 to 2 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 2 percent  
*Mean annual precipitation:* 15 to 19 inches

## Composition

### Major Components

Farnuf and similar soils: 85 percent

### Minor Components

Pachel and similar soils: 0 to 5 percent

Savage and similar soils: 0 to 4 percent

Cambert and similar soils: 0 to 3 percent

Daglun and similar soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 35C—Farnuf loam, 2 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 15 to 19 inches

### Composition

#### Major Components

Farnuf and similar soils: 85 percent

#### Minor Components

Pachel and similar soils: 0 to 5 percent

Savage and similar soils: 0 to 4 percent

Cambert and similar soils: 0 to 3 percent

Daglun and similar soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Floweree Series

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Permeability:* Moderately slow (0.2 to 0.6 inch/hour)

*Landform:* Alluvial fans and stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 8 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-silty, mixed Aridic Haploborolls

## Typical Pedon

Floweree silt loam, 2 to 8 percent slopes, in an area of cropland, 2,500 feet north and 2,200 feet west of the southeast corner of sec. 31, T. 10 N., R. 57 E.

A—0 to 5 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; neutral; clear smooth boundary.

Bw1—5 to 12 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; slightly alkaline; clear smooth boundary.

Bw2—12 to 22 inches; grayish brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) moist; strong medium prismatic structure parting to strong medium subangular blocky; slightly hard, friable, moderately sticky, moderately plastic; common very fine roots; many very fine pores; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—22 to 34 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, moderately plastic;

common very fine roots; common very fine pores; few fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

**Bk2**—34 to 45 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, moderately plastic, common very fine roots; common very fine tubular pores; common fine masses of lime; violently effervescent; strongly alkaline; gradual smooth boundary.

**Bk3**—45 to 60 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; moderate medium and fine subangular blocky structure; hard, friable, moderately sticky, moderately plastic; few very fine roots; common very fine pores; common fine masses of lime; violently effervescent; strongly alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Thickness of the mollic epipedon:* 7 to 16 inches

*Depth to the Bk horizon:* 11 to 25 inches

#### A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Reaction: pH 6.6 to 8.4

#### Bw1 horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Silt loam or silty clay loam

Clay content: 20 to 35 percent

Calcium carbonate equivalent: 1 to 5 percent

Reaction: pH 7.4 to 8.4

#### Bw2 horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Silt loam or silty clay loam

Clay content: 20 to 35 percent

Calcium carbonate equivalent: 1 to 5 percent

Reaction: pH 7.4 to 8.4

#### Bk1 horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Silt loam or silty clay loam

Clay content: 20 to 35 percent

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

#### Bk2 horizon

Hue: 10YR or 2.5Y

Value: 5 to 8 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Silt loam or silty clay loam

Clay content: 20 to 35 percent

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.9 to 9.0

#### Bk3 horizon

Hue: 10YR or 2.5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Silty clay loam, silt loam, or loam

consisting of thin strata of silt loam, very fine sandy loam, and/or clay loam

Clay content: 20 to 35 percent

Calcium carbonate equivalent: 5 to 15 percent

Gypsum: 0 to 5 percent

Electrical conductivity: 0 to 4 mmhos/cm

Sodium adsorption ratio: 1 to 5

Reaction: pH 7.9 to 9.0

## 82A—Floweree silt loam, 0 to 2 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 2 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Floweree and similar soils: 85 percent

#### Minor Components

Lonna and similar soils: 0 to 4 percent

Soils with lighter colored surface layers: 0 to 3 percent

Soils that are calcareous throughout: 0 to 3 percent

Alona and similar soils: 0 to 3 percent

Very deep clayey soils: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Silt loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 82C—Floweree silt loam, 2 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Floweree and similar soils: 85 percent

#### Minor Components

Lonna and similar soils: 0 to 3 percent

Soils with lighter colored surface layers: 0 to 3 percent

Soils that are calcareous throughout: 0 to 3 percent

Alona and similar soils: 0 to 3 percent

Very deep clayey soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Silt loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Gerdrum Series

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Permeability:* Very slow (<0.06 inch/hour)

*Landform:* Alluvial fans and stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 8 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine, montmorillonitic Typic Natriboralfs

### Typical Pedon

Gerdrum clay loam, 2 to 8 percent slopes, in an area of rangeland, 1,700 feet north and 1,800 feet west of the southeast corner of sec. 21, T. 7 N., R. 59 E.

A—0 to 1 inch; light grayish brown (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium granular structure; loose, very friable, slightly sticky, slightly plastic; many very fine roots; neutral; abrupt smooth boundary.

E—1 to 3 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; strong thin platy structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine roots; neutral; abrupt smooth boundary.

Btn—3 to 11 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; strong medium columnar structure parting to strong coarse and medium subangular blocky; extremely hard, firm, moderately sticky, moderately plastic; many very fine roots; many faint continuous clay films on faces of peds and in pores; moderately alkaline; clear smooth boundary.

Btnk—11 to 17 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, moderately sticky, moderately plastic; common very fine roots; many faint continuous clay films on faces of peds and in pores; few fine masses of lime; slightly effervescent; strongly alkaline; gradual smooth boundary.

Bknyz1—17 to 25 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, very sticky, very plastic; few very fine roots; many fine masses of lime, many fine seams and masses of gypsum and other salts; slightly effervescent; strongly alkaline; gradual smooth boundary.

Bknyz2—25 to 41 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure; slightly hard, friable, very sticky, very plastic; few very fine roots; many fine masses of lime; many fine seams and masses of gypsum and other salts; violently

effervescent; strongly alkaline; gradual smooth boundary.

Bknyz3—41 to 60 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure; hard, firm, moderately sticky, moderately plastic; few very fine roots; many fine masses of lime; many fine seams and masses of gypsum and other salts; violently effervescent; strongly alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at 20 inches is 41 degrees F or above.

*Depth to the Btnk horizon:* 10 to 24 inches

*Depth to gypsum:* 10 to 28 inches

*Other features:* In cultivated areas, a clay loam texture results from mixing the A, E, and upper part of the Bt horizons. Some pedons have a 2Bkyz horizon with 15 to 25 percent pebbles.

#### A horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Clay loam mixed to 7 inches  
(uncultivated areas have a thin A horizon that is a loam or silt loam)

Clay content: 10 to 25 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

#### E horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 or 3

Texture: Clay loam mixed to 7 inches  
(uncultivated areas have a thin A horizon that is a loam or silt loam)

Clay content: 10 to 25 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

#### Btn horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Clay, silty clay, or silty clay loam

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 10 percent pebbles

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 10 to 20; pedons with sodium adsorption ratios of less than 13 have more exchangeable magnesium plus sodium than calcium plus exchange acidity at pH 8.2

Reaction: pH 7.4 to 9.0

#### Btnk horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 or 3

Texture: Clay, silty clay, silty clay loam, or clay loam

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 10 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 13 to 20

Reaction: pH 7.4 to 9.0

#### Bknyz horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Clay loam, sandy clay loam, clay, or silty clay

Clay content: 10 to 50 percent

Content of rock fragments: 0 to 10 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 30

Gypsum: 1 to 5 percent

Reaction: pH 7.9 to 9.0

## 65A—Gerdrum clay loam, 0 to 2 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 2 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Gerdrum and similar soils: 85 percent

#### Minor Components

Areas barren of vegetation: 0 to 3 percent

Creed and similar soils: 0 to 3 percent

Strongly saline soils: 0 to 3 percent

Very deep nonsaline soils: 0 to 3 percent

Very deep nonsodic soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 65C—Gerdrum clay loam, 2 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Gerdrum and similar soils: 85 percent

##### Minor Components

Areas barren of vegetation: 0 to 3 percent  
 Creed and similar soils: 0 to 3 percent  
 Strongly saline soils: 0 to 3 percent  
 Very deep nonsaline soils: 0 to 3 percent  
 Very deep nonsodic soils: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 165A—Gerdrum-Absher complex, 0 to 2 percent slopes

#### Setting

*Landform:*

- Gerdrum—Alluvial fans and stream terraces
- Absher—Alluvial fans and stream terraces

*Slope:*

- Gerdrum—0 to 2 percent
- Absher—0 to 2 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Gerdrum and similar soils: 60 percent  
 Absher and similar soils: 30 percent

##### Minor Components

Weingart and similar soils: 0 to 2 percent  
 Creed and similar soils: 0 to 2 percent  
 Very deep silty clay soils: 0 to 2 percent  
 Very deep nonsaline soils: 0 to 2 percent  
 Soils with loam surface layers: 0 to 1 percent  
 Areas barren of vegetation: 0 to 1 percent

#### Major Component Description

##### Gerdrum

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 6.1 inches

##### Absher

*Surface layer texture:* Clay  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Moderately well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 165C—Gerdrum-Absher complex, 2 to 8 percent slopes

### Setting

#### Landform:

- Gerdrum—Alluvial fans and stream terraces
- Absher—Alluvial fans and stream terraces

#### Slope:

- Gerdrum—2 to 8 percent
- Absher—2 to 8 percent

Mean annual precipitation: 10 to 14 inches

### Composition

#### Major Components

Gerdrum and similar soils: 60 percent  
Absher and similar soils: 30 percent

#### Minor Components

Weingart and similar soils: 0 to 2 percent  
Creed and similar soils: 0 to 2 percent  
Very deep silty clay soils: 0 to 2 percent  
Very deep nonsaline soils: 0 to 2 percent  
Soils with loam surface layers: 0 to 1 percent  
Areas barren of vegetation: 0 to 1 percent

### Major Component Description

#### Gerdrum

Surface layer texture: Clay loam

Depth class: Very deep (>60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Salt affected: Saline within 30 inches

Sodium affected: Sodic within 30 inches

Available water capacity: Mainly 6.1 inches

#### Absher

Surface layer texture: Clay

Depth class: Very deep (>60 inches)

Drainage class: Moderately well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Salt affected: Saline within 30 inches

Sodium affected: Sodic within 30 inches

Available water capacity: Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## Glendive Series

Depth class: Very deep (>60 inches)

Drainage class: Well drained and moderately well drained

Permeability: Moderately rapid (2.0 to 6.0 inches/hour)

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 4 percent

Annual precipitation: 10 to 14 inches

**Taxonomic Class:** Coarse-loamy, mixed, (calcareous), frigid Aridic Ustifluvents

### Typical Pedon

Glendive sandy loam, 0 to 2 percent slopes, in an area of rangeland, 2,500 feet north and 1,000 feet east of the southwest corner of sec. 6, T. 6 N., R. 56 E.

A—0 to 3 inches; pale brown (10YR 6/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; loose, slightly sticky, nonplastic; many very fine roots; moderately alkaline; clear smooth boundary.

C1—3 to 13 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky, nonplastic; many very fine roots; slightly effervescent; moderately alkaline; gradual smooth boundary.

C2—13 to 27 inches; pale brown (10YR 6/3) sandy loam that has few thin strata of loamy sand, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky, nonplastic; many very fine roots; slightly effervescent; moderately alkaline; gradual smooth boundary.

C3—27 to 60 inches; pale brown (10YR 6/3) stratified fine sandy loam and loamy sand, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky, nonplastic; few fine roots; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 8 and 24 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher.

*Soil phases:* A saline phase is recognized; this phase is moderately well drained and has a water table at a depth of 42 to 60 inches

#### A horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 or 3

Clay content: 5 to 18 percent clay

Electrical conductivity: 0 to 4 mmhos/cm; saline phase 4 to 8 mmhos/cm

Reaction: pH 6.6 to 9.0

#### C horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam, silt loam, sandy loam, or fine sandy loam

Clay content: 5 to 20 percent

Content of rock fragments: 0 to 15 percent pebbles

Electrical conductivity: 0 to 8 mmhos/cm; saline phase 8 to 16 mmhos/cm

Reaction: pH 7.4 to 9.6

### 61A—Glendive sandy loam, 0 to 2 percent slopes

#### Setting

*Landform:* Flood plains

*Slope:* 0 to 2 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Glendive and similar soils: 85 percent

##### Minor Components

Areas of channels with steep slopes: 0 to 3 percent

Poorly drained soils: 0 to 3 percent

Havre and similar soils: 0 to 3 percent

Hanly and similar soils: 0 to 3 percent

Soils with gravelly loam substratums: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Sandy loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Available water capacity:* Mainly 7.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 161B—Glendive sandy loam, saline, 0 to 4 percent slopes

#### Setting

*Landform:* Flood plains

*Slope:* 0 to 4 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Glendive and similar soils: 85 percent

##### Minor Components

Havre and similar soils: 0 to 3 percent

Nonsaline Glendive soils: 0 to 3 percent

Strongly saline soils: 0 to 3 percent

Strongly sodic soils: 0 to 2 percent

Areas of gullies and channels: 0 to 2 percent

Poorly drained and ponded soils: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Sandy loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Moderately well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 5.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Grail Series

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Permeability:* Slow (0.06 to 0.2 inch/hour)

*Landform:* Alluvial fans and stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 4 percent

*Annual precipitation:* 15 to 19 inches

**Taxonomic Class:** Fine, montmorillonitic Pachic Argiborolls

### Typical Pedon

Grail silt loam, 0 to 4 percent slopes, in an area of cropland, 2,500 feet north and 1,000 feet west of the southeast corner of sec. 22, T. 10 N., R. 60 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate medium granular; hard, friable, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; neutral; abrupt smooth boundary.

A2—6 to 11 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine subangular blocky structure; hard, friable, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; slightly alkaline; clear wavy boundary.

Bt—11 to 21 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; strong medium prismatic structure parting to strong medium and fine subangular blocky; very hard, firm, very sticky, very plastic; many very fine roots; many very fine tubular pores; many distinct clay films on faces of ped; moderately alkaline; gradual wavy boundary.

Bk1—21 to 37 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, very sticky, very plastic; common very fine roots; many very fine tubular pores;

many fine masses of lime; violently effervescent; moderately alkaline; gradual irregular boundary.  
Bk2—37 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; hard, firm, very sticky, very plastic; common very fine roots; many very fine tubular pores; common fine masses of lime; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 17 to 36 inches

*Depth to the Bk horizon:* 20 to 36 inches

#### A horizons

Value: 3 to 5 dry; 2 or 3 moist

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.1 to 7.8

#### Bt horizon

Hue: 10YR or 2.5Y

Value: 3 to 6 dry; 2 to 4 moist

Chroma: 1 to 3

Texture: Silty clay, silty clay loam, clay, or clay loam

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.6 to 8.4

#### Bk horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 7 dry; 3 to 5 moist

Chroma: 2 to 4

Texture: Silty clay, silty clay loam, or clay loam

Clay content: 27 to 45 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

### 43B—Grail silt loam, 0 to 4 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 4 percent

*Mean annual precipitation:* 15 to 19 inches

#### Composition

##### Major Components

Grail and similar soils: 85 percent

##### Minor Components

Very deep clay loam soils: 0 to 3 percent

Very deep loamy soils: 0 to 3 percent

Soils with gravelly loam substratums: 0 to 3 percent

Soils with slopes more than 4 percent: 0 to 3 percent  
 Moderately saline soils: 0 to 2 percent  
 Moderately sodic soils: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Hanly Series

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Somewhat excessively drained  
*Permeability:* Rapid (6.0 to 20.0 inches/hour)  
*Landform:* Flood plains  
*Parent material:* Alluvium  
*Slope range:* 0 to 4 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Sandy, mixed, frigid Aridic  
 Ustifluvents

### Typical Pedon

Hanly fine sandy loam, in an area of Hanly-Ryell fine sandy loams, 0 to 4 percent slopes, in an area of tame pasture, 200 feet south and 2,000 feet east of the northwest corner of sec. 35, T. 5 N., R. 60 E.

Ap—0 to 4 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure parting to moderate fine subangular blocky; slightly hard, very friable, slightly sticky, nonplastic; many very fine and common fine roots; slightly alkaline; clear smooth boundary.

C1—4 to 13 inches; light brownish gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; moderate coarse subangular blocky structure; slightly hard, very friable, slightly sticky, nonplastic; common very fine roots; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—13 to 60 inches; light brownish gray (2.5Y 6/2) stratified loamy sand and sand, grayish brown (2.5Y 5/2) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; slightly effervescent; moderately alkaline.

### Range in Characteristics

#### Ap horizon

Hue: 2.5Y or 10YR  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 or 3  
 Clay content: 10 to 20 percent  
 Reaction: pH 6.6 to 7.8

#### C horizons

Hue: 10YR, 2.5Y, or 5Y  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Clay content: 5 to 10 percent  
 Calcium carbonate equivalent: 1 to 5 percent  
 Reaction: pH 7.4 to 8.4

### 7B—Hanly-Ryell fine sandy loams, 0 to 4 percent slopes

#### Setting

##### Landform:

- Hanly—Flood plains
- Ryell—Flood plains

##### Slope:

- Hanly—0 to 4 percent
- Ryell—0 to 4 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Hanly and similar soils: 50 percent  
 Ryell and similar soils: 35 percent

##### Minor Components

Frequently flooded soils: 0 to 4 percent  
 Poorly drained and ponded soils: 0 to 4 percent  
 Noncalcareous soils: 0 to 3 percent  
 Areas of channels with steep slopes: 0 to 3 percent  
 Very deep sandy loam soils: 0 to 1 percent

### Major Component Description

#### Hanly

*Surface layer texture:* Fine sandy loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Somewhat excessively drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland

*Flooding:* Rare

*Available water capacity:* Mainly 5.9 inches

### **Ryell**

*Surface layer texture:* Fine sandy loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Available water capacity:* Mainly 4.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **Harlake Series**

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained and moderately well drained

*Permeability:* Slow (0.06 to 0.2 inch/hour)

*Landform:* Flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine, montmorillonitic, (calcareous), frigid Aridic Ustifluvents

### **Typical Pedon**

Harlake silty clay loam, 0 to 2 percent slopes, in an area of rangeland, 500 feet north and 1,300 feet east of the southwest corner of sec. 3, T. 9 N., R. 56 E.

A—0 to 4 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; very hard, very firm, moderately sticky, moderately plastic; common very fine roots; slightly effervescent; slightly alkaline; abrupt smooth boundary.

C1—4 to 15 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; strong medium subangular blocky structure; extremely hard, very firm, very sticky, very plastic; common very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

C2—15 to 32 inches; light brownish gray (10YR 6/2) silty clay, grayish brown (10YR 5/2) moist; massive; very hard, firm, very sticky, very plastic; few very fine roots; few fine masses of lime; disseminated lime; strongly effervescent; slightly alkaline; gradual smooth boundary.

C3—32 to 60 inches; light brownish gray (2.5Y 6/2) silty clay that has few thin strata of clay loam, grayish brown (2.5Y 5/2) moist; massive; very hard, firm, very sticky, very plastic; few very fine roots; disseminated lime; strongly effervescent; moderately alkaline.

### **Range in Characteristics**

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher.

*Soil phases:* A saline phase is recognized. This phase is moderately well drained and has a water table at a depth of 42 to 60 inches.

#### *A horizon*

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Silty clay loam or silty clay

Clay content: 27 to 55 percent

Electrical conductivity: 0 to 8 mmhos/cm

Sodium adsorption ratio: 0 to 8

Calcium carbonate equivalent: 1 to 5 percent

Reaction: pH 7.4 to 8.4

#### *C1 horizon*

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Clay, silty clay, or silty clay loam

Clay content: 35 to 60 percent

Electrical conductivity: 0 to 16 mmhos/cm

Sodium adsorption ratio: 4 to 30

Calcium carbonate equivalent: 2 to 10 percent

Reaction: pH 7.4 to 9.0

#### *C2 and C3 horizons*

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Clay, silty clay, or silty clay loam

Clay content: 35 to 60 percent

Electrical conductivity: 0 to 16 mmhos/cm

Sodium adsorption ratio: 4 to 30

Calcium carbonate equivalent: 2 to 10 percent  
Reaction: pH 7.4 to 9.0

### **57A—Harlake silty clay, saline, 0 to 2 percent slopes**

#### **Setting**

*Landform:* Flood plains  
*Slope:* 0 to 2 percent  
*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Harlake and similar soils: 85 percent

##### **Minor Components**

Nonsaline soils: 0 to 4 percent  
Poorly drained and ponded soils: 0 to 4 percent  
Havre and similar soils: 0 to 4 percent  
Frequently flooded soils: 0 to 3 percent

#### **Major Component Description**

*Surface layer texture:* Silty clay  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Moderately well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Water table:* Apparent  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 6.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **157A—Harlake silty clay loam, 0 to 2 percent slopes**

#### **Setting**

*Landform:* Flood plains  
*Slope:* 0 to 2 percent  
*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Harlake and similar soils: 90 percent

##### **Minor Components**

Havre and similar soils: 0 to 2 percent  
Frequently flooded soils: 0 to 2 percent  
Areas of channels with steep slopes: 0 to 2 percent  
Moderately saline soils: 0 to 2 percent  
Moderately sodic soils: 0 to 1 percent  
Poorly drained and ponded soils: 0 to 1 percent

#### **Major Component Description**

*Surface layer texture:* Silty clay loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Available water capacity:* Mainly 9.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

#### **Havre Series**

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well and moderately well drained  
*Permeability:* Moderate (0.6 to 2.0 inches/hour)  
*Landform:* Flood plains  
*Parent material:* Alluvium  
*Slope range:* 0 to 4 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-loamy, mixed, (calcareous), frigid Aridic Ustifluvents

#### **Typical Pedon**

Havre loam, 0 to 2 percent slopes, in an area of rangeland, 1,900 feet north and 200 feet east of the southwest corner of sec. 16, T. 7 N., R. 59 E.

A—0 to 2 inches; pale brown (10YR 6/3) loam, dark grayish brown (10YR 5/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many fine roots; many fine tubular pores; moderately alkaline; gradual smooth boundary.

- C1—2 to 17 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, slightly sticky, nonplastic; many fine roots; many fine tubular pores; slightly effervescent; moderately alkaline; gradual smooth boundary.
- C2—17 to 38 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; many fine roots; many fine tubular pores; strongly effervescent; moderately alkaline; gradual smooth boundary.
- C3—38 to 60 inches; light brownish gray (10YR 6/2) loam that has few thin strata of fine sandy loam and silt loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; few fine roots; common fine tubular pores; slightly effervescent; moderately alkaline.

### Range in Characteristics

- Soil temperature:* 40 to 47 degrees F
- Moisture control section:* Between 4 and 12 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher.
- Soil phases:* A saline phase is recognized; it is moderately well drained and has a water table at 36 to 60 inches.
- Other features:* In cultivated areas, a loam texture results from mixing the A horizon and upper part of the C horizon.
- A horizon*  
 Hue: 10YR or 2.5Y  
 Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 or 3  
 Clay content: 15 to 27 percent  
 Calcium carbonate equivalent: 1 to 5 percent  
 Electrical conductivity: 0 to 2 mmhos/cm; saline phase is 8 to 16 mmhos/cm  
 Reaction: pH 6.1 to 9.0
- C1 horizon*  
 Hue: 10YR, 2.5Y, or 5Y  
 Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 or 3  
 Texture: Loam, silt loam, or clay loam  
 Clay content: 18 to 35 percent  
 Calcium carbonate equivalent: 5 to 10 percent  
 Electrical conductivity: 0 to 4 mmhos/cm; saline phase is 8 to 16 mmhos/cm

Sodium adsorption ratio: 0 to 13  
 Reaction: pH 7.4 to 9.0

### C2 and C3 horizons

Hue: 10YR, 2.5Y, or 5Y  
 Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 or 3  
 Texture: Loam, silt loam, or clay loam consisting of strata of silt loam, fine sandy loam, silty clay loam, and clay loam  
 Clay content: 18 to 35 percent  
 Calcium carbonate equivalent: 1 to 5 percent  
 Electrical conductivity: 0 to 4 mmhos/cm; saline phase is 8 to 16 mmhos/cm  
 Sodium adsorption ratio: 0 to 13  
 Reaction: pH 7.4 to 9.0

## 56A—Havre loam, 0 to 2 percent slopes

### Setting

*Landform:* Flood plains  
*Slope:* 0 to 2 percent  
*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Havre and similar soils: 85 percent

#### Minor Components

Glendive and similar soils: 0 to 3 percent  
 Poorly drained and ponded soils: 0 to 3 percent  
 Noncalcareous soils: 0 to 3 percent  
 Frequently flooded soils: 0 to 3 percent  
 Moderately saline soils: 0 to 2 percent  
 Very deep silt loam soils: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Available water capacity:* Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 156A—Havre loam, saline, 0 to 2 percent slopes

#### Setting

*Landform:* Flood plains

*Slope:* 0 to 2 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Havre and similar soils: 85 percent

##### Minor Components

Glendive and similar soils: 0 to 5 percent

Harlake and similar soils: 0 to 4 percent

Areas of channels with steep slopes: 0 to 2 percent

Frequently flooded soils: 0 to 2 percent

Noncalcareous soils: 0 to 1 percent

Poorly drained and ponded soils: 0 to 1 percent

#### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Moderately well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Water table:* Apparent

*Salt affected:* Saline within 30 inches

*Available water capacity:* Mainly 6.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 256A—Havre-Harlake complex, 0 to 2 percent slopes

#### Setting

*Landform:*

- Havre—Flood plains
- Harlake—Flood plains

*Slope:*

- Havre—0 to 2 percent
- Harlake—0 to 2 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Havre and similar soils: 50 percent

Harlake and similar soils: 40 percent

##### Minor Components

Glendive and similar soils: 0 to 2 percent

Moderately saline soils: 0 to 2 percent

Areas of channels with steep slopes: 0 to 2 percent

Poorly drained and ponded soils: 0 to 2 percent

Frequently flooded soils: 0 to 1 percent

Noncalcareous soils: 0 to 1 percent

#### Major Component Description

##### Havre

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Available water capacity:* Mainly 9.7 inches

##### Harlake

*Surface layer texture:* Silty clay loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Available water capacity:* Mainly 9.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Kirby Series

*Depth class:* Very deep (>60 inches)

*Drainage class:* Excessively drained

*Permeability:* Rapid (6.0 to 20.0 inches/hour)

*Landform:* Hills

*Parent material:* Scorio (baked shale and sandstone)

*Slope range:* 8 to 60 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Loamy-skeletal over fragmental, mixed (calcareous), frigid Aridic Ustorthents

### Typical Pedon

Kirby channery loam, in an area of Kirby-Cabbart complex, 8 to 25 percent slopes, in an area of rangeland, 100 feet north and 800 feet west of the southeast corner of sec. 21, T. 7 N., R. 59 E.

A—0 to 6 inches; reddish brown (5YR 5/4) channery loam, reddish brown (5YR 4/4) moist; weak fine granular structure; soft very friable, slightly sticky, slightly plastic; many very fine roots; 25 percent channers; slightly effervescent; slightly alkaline; clear smooth boundary.

Bk—6 to 14 inches; light reddish brown (5YR 6/4) extremely channery sandy loam, reddish brown (5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky, slightly plastic; common very fine and fine roots matted between channers; 10 percent flagstones and 70 percent channers; common distinct lime coats on rock fragments; disseminated lime; violently effervescent; moderately alkaline; gradual wavy boundary.

2C—14 to 60 inches; reddish brown (5YR 5/4) hard, shattered and fractured scorio, reddish brown (5YR 4/4) moist; few fine roots in fractures; common faint lime coats on bottom surfaces of rock fragments in the upper few inches.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 8 and 24 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher.

*Depth to fragmental material:* 11 to 20 inches

#### A horizon

Hue: 5YR or 7.5YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Clay content: 10 to 22 percent

Content of rock fragments: 15 to 60 percent—0 to 5 percent stones and flagstones; 15 to 55 percent channers

Reaction: pH 7.4 to 8.4

#### Bk horizon

Hue: 2.5YR, 5YR, or 7.5YR

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 3, 4, or 6

Texture: Loam or sandy loam

Clay content: 8 to 22 percent

Content of rock fragments: 40 to 90 percent—5 to 20 percent flagstones and cobbles; 35 to 70 percent channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

#### 2C horizon

Features: This horizon consists of highly fractured and displaced scorio. The coloring of this material ranges from reddish gray (10R 6/1) through yellowish red (5YR 4/6). Rock fragments of stones, flagstones, and channers make up 90 to 95 percent of this horizon.

### 176D—Kirby-Cabbart complex, 8 to 25 percent slopes

#### Setting

##### Landform:

- Kirby—Hills
- Cabbart—Hills

##### Position on landform:

- Kirby—Shoulders and summits
- Cabbart—Backslopes and shoulders

##### Slope:

- Kirby—8 to 25 percent
- Cabbart—8 to 25 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Kirby and similar soils: 50 percent

Cabbart and similar soils: 35 percent

##### Minor Components

Very shallow loamy soils: 0 to 3 percent

Yawdim and similar soils: 0 to 3 percent

Soils with slopes more than 25 percent: 0 to 3 percent

Delpoint and similar soils: 0 to 2 percent

Areas of rock outcrop: 0 to 2 percent

Soils with noncalcareous surface layers: 0 to 2 percent

#### Major Component Description

##### Kirby

*Surface layer texture:* Channery loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Excessively drained

*Dominant parent material:* Material weathered from baked sandstone and shale

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.4 inches

### **Cabbart**

*Surface layer texture:* Silt loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## **276F—Kirby-Blacksheep-Rock outcrop complex, 25 to 60 percent slopes**

### **Setting**

*Landform:*

- Kirby—Hills
- Blacksheep—Hills
- Rock outcrop—Hills

*Position on landform:*

- Kirby—Shoulders and summits
- Blacksheep—Backslopes and shoulders

*Slope:*

- Kirby—25 to 60 percent
- Blacksheep—25 to 50 percent

*Mean annual precipitation:* 10 to 14 inches

### **Composition**

#### **Major Components**

Kirby and similar soils: 40 percent

Blacksheep and similar soils: 35 percent

Rock outcrop: 15 percent

#### **Minor Components**

Cabbart and similar soils: 0 to 2 percent

Very shallow loamy soils: 0 to 2 percent

Twilight and similar soils: 0 to 2 percent

Delpoint and similar soils: 0 to 2 percent

Soils with slopes more than 60 percent: 0 to 1 percent

Moderately saline soils: 0 to 1 percent

## **Major Component Description**

### **Kirby**

*Surface layer texture:* Channery loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Excessively drained

*Dominant parent material:* Material weathered from baked sandstone and shale

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.4 inches

### **Blacksheep**

*Surface layer texture:* Fine sandy loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.7 inches

### **Rock outcrop**

*Definition:* Mainly baked shale and sandstone.

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **Kobase Series**

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Permeability:* Slow (0.06 to 0.2 inch/hour)

*Landform:* Alluvial fans and stream terraces

*Parent material:* Alluvium

*Slope range:* 2 to 8 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine, montmorillonitic, frigid Aridic Ustochrepts

### **Typical Pedon**

Kobase silty clay loam, 2 to 8 percent slopes, in an area of cropland, 10 feet south and 2,000 feet east of the northwest corner of sec. 28, T. 9 N., R. 57 E.

Ap—0 to 7 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist;

moderate very fine and fine granular structure; hard, friable, moderately sticky, moderately plastic; common very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

- Bw**—7 to 17 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; extremely hard, very firm, very sticky, very plastic; common very fine roots; common very fine pores; disseminated lime; strongly effervescent; moderately alkaline; gradual wavy boundary.
- Bk**—17 to 38 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate coarse and medium subangular blocky structure; extremely hard, very firm, very sticky, very plastic; common very fine roots; common very fine pores; disseminated lime; common fine masses of lime; violently effervescent; strongly alkaline; gradual wavy boundary.
- Bky**—38 to 60 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; weak coarse subangular blocky structure; extremely hard, very firm, very sticky, very plastic; few very fine roots; many fine masses of lime; common fine gypsum crystals; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at 20 inches is 41 degrees F or higher.

*Depth to the Bk horizon:* 12 to 17 inches

*Depth to the Bky horizon:* 25 to 40 inches

#### *Ap horizon*

Hue: 10YR or 2.5Y  
Value: 5 or 6 dry; 4 or 5 moist  
Chroma: 2 or 3  
Clay content: 27 to 40 percent  
Content of rock fragments: 0 to 5 percent pebbles  
Electrical conductivity: 0 to 2 mmhos/cm  
Calcium carbonate equivalent: 0 to 5 percent  
Reaction: pH 6.6 to 8.4

#### *Bw horizon*

Hue: 10YR, 2.5Y, or 5Y  
Value: 5 or 6 dry; 4 or 5 moist  
Chroma: 1 to 4  
Texture: Silty clay loam, silty clay, or clay  
Clay content: 35 to 45 percent

Content of rock fragments: 0 to 5 percent pebbles  
Calcium carbonate equivalent: 0 to 10 percent  
Electrical conductivity: 0 to 2 mmhos/cm  
Reaction: pH 7.4 to 8.4

#### *Bk horizon*

Hue: 10YR, 2.5Y, or 5Y  
Value: 5 to 7 dry; 4 to 6 moist  
Chroma: 1 to 4  
Texture: Silty clay loam, silty clay, or clay  
Clay content: 35 to 45 percent  
Content of rock fragments: 0 to 5 percent pebbles  
Calcium carbonate equivalent: 5 to 15 percent  
Sodium adsorption ratio: 0 to 10  
Electrical conductivity: 0 to 2 mmhos/cm  
Reaction: pH 7.9 to 9.0

#### *Bky horizon*

Hue: 10YR, 2.5Y, or 5Y  
Value: 5 to 7 dry; 4 to 6 moist  
Chroma: 1 to 4  
Texture: Silty clay loam, silty clay, or clay  
Clay content: 35 to 45 percent  
Content of rock fragments: 0 to 5 percent pebbles  
Calcium carbonate equivalent: 5 to 15 percent  
Sodium adsorption ratio: 1 to 13  
Electrical conductivity: 0 to 4 mmhos/cm  
Gypsum: 1 to 5 percent  
Reaction: pH 7.9 to 9.0

## 78C—Kobase silty clay loam, 2 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Kobase and similar soils: 85 percent

#### Minor Components

Orinoco and similar soils: 0 to 3 percent  
Noncalcareous deep soils: 0 to 3 percent  
Soils with darker-colored surface layers: 0 to 3 percent  
Soils with loam or silt loam surfaces: 0 to 3 percent  
Yamacall and similar soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Silty clay loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Kremlin Series

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate (0.6 to 2.0 inches/hour)  
*Landform:* Alluvial fans, stream terraces, and sedimentary plains  
*Parent material:* Alluvium  
*Slope range:* 0 to 8 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-loamy, mixed Aridic Haploborolls

### Typical Pedon

Kremlin loam, 2 to 8 percent slopes, in an area of rangeland, 600 feet north and 1,900 feet east of the southwest corner of sec. 31, T. 10 N., R. 57 E.

A1—0 to 3 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine granular structure; hard, very friable, slightly sticky, slightly plastic; many very fine and few fine roots; neutral; clear smooth boundary.

A2—3 to 8 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and few fine roots; neutral; abrupt smooth boundary.

Bw—8 to 14 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; strong medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and few fine roots; slightly effervescent; slightly alkaline; clear smooth boundary.

Bk1—14 to 26 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; moderate medium and fine subangular blocky structure;

slightly hard, very friable, slightly sticky, slightly plastic; common very fine roots; few fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—26 to 40 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine roots; common fine masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

BC—40 to 60 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; few very fine roots; disseminated lime; violently effervescent; strongly alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches; dry in some part six-tenths or more of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher.

*Thickness of the mollic epipedon:* 7 to 15 inches

*Depth to the Bk horizon:* 10 to 24 inches

#### A1 horizon

Hue: 10YR or 2.5Y

Value: 2 or 3 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.1 to 7.8

#### A2 horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.1 to 7.8

#### Bw horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Loam, silt loam, clay loam, or sandy clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bk1 horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 or 3  
 Texture: Loam, silt loam, clay loam, or sandy clay loam  
 Clay content: 18 to 30 percent  
 Content of rock fragments: 0 to 5 percent pebbles  
 Calcium carbonate equivalent: 5 to 15 percent  
 Electrical conductivity: 0 to 2 mmhos/cm  
 Reaction: pH 7.4 to 8.4

*Bk2 and BC horizons*

Hue: 10YR, 2.5Y, or 5Y  
 Value: 6 to 8 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Texture: Loam, silt loam, clay loam, or sandy clay loam  
 Clay content: 18 to 30 percent  
 Content of rock fragments: 0 to 5 percent pebbles  
 Calcium carbonate equivalent: 3 to 12 percent  
 Electrical conductivity: 0 to 4 mmhos/cm  
 Reaction: pH 7.4 to 9.0

**72A—Kremlin loam, 0 to 2 percent slopes**

**Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 2 percent  
*Mean annual precipitation:* 10 to 14 inches

**Composition**

**Major Components**

Kremlin and similar soils: 85 percent

**Minor Components**

Yamacall and similar soils: 0 to 5 percent  
 Chanta and similar soils: 0 to 4 percent  
 Alona and similar soils: 0 to 3 percent  
 Eapa and similar soils: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**72C—Kremlin loam, 2 to 8 percent slopes**

**Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

**Composition**

**Major Components**

Kremlin and similar soils: 85 percent

**Minor Components**

Yamacall and similar soils: 0 to 3 percent  
 Alona and similar soils: 0 to 3 percent  
 Eapa and similar soils: 0 to 3 percent  
 Chanta and similar soils: 0 to 3 percent  
 Kremlin and similar soils, gravelly, with slopes more than 8 percent: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**172C—Kremlin-Cabbart complex, 2 to 8 percent slopes**

**Setting**

*Landform:*

- Kremlin—Sedimentary plains
- Cabbart—Sedimentary plains

*Position on landform:*

- Kremlin—Backslopes and footslopes
- Cabbart—Shoulders and summits

*Slope:*

- Kremlin—2 to 8 percent
- Cabbart—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Kremlin and similar soils: 50 percent

Cabbart and similar soils: 35 percent

#### Minor Components

Very shallow loamy soils: 0 to 4 percent

Delpoint and similar soils: 0 to 3 percent

Yamacall and similar soils: 0 to 3 percent

Moderately saline soils: 0 to 2 percent

Very deep clayey soils: 0 to 2 percent

Soils with gravelly surface layers: 0 to 1 percent

### Major Component Description

#### Kremlin

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 10.8 inches

#### Cabbart

*Surface layer texture:* Silt loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Lonna Series

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Permeability:* Moderate (0.6 to 2.0 inches/hour)

*Landform:* Alluvial fans, stream terraces, sedimentary plains, and hills

*Parent material:* Alluvium

*Slope range:* 0 to 25 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-silty, mixed, frigid Aridic Ustochrepts

### Typical Pedon

Lonna silt loam, 2 to 8 percent slopes, in an area of rangeland, 200 feet north and 750 feet west of the southeast corner of sec. 29, T. 9 N., R. 56 E.

A—0 to 3 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine tubular pores; slightly alkaline; clear smooth boundary.

Bw—3 to 11 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine tubular pores; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—11 to 30 inches; pale yellow (2.5Y 7/4) silt loam, light olive brown (2.5Y 5/4) moist; moderate medium and fine subangular blocky structure; slightly hard, very friable, moderately sticky, slightly plastic; few very fine roots; common very fine tubular pores; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—30 to 36 inches; pale yellow (2.5Y 7/4) silt loam, light olive brown (2.5Y 5/4) moist; moderate medium and fine subangular blocky structure; slightly hard, very friable, moderately sticky, slightly plastic; few very fine roots; common very fine tubular pores; common fine masses of lime; violently effervescent; strongly alkaline; gradual wavy boundary.

BC—36 to 60 inches; pale yellow (2.5Y 7/4) silt loam, light olive brown (2.5Y 5/4) moist; weak medium and fine subangular blocky structure; slightly hard, very friable, moderately sticky, slightly plastic; common very fine tubular pores; violently effervescent; strongly alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches;

dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher.

*Depth to the Bk horizon:* 10 to 12 inches

*A horizon*

Hue: 10YR or 2.5Y  
 Value: 5 or 6 dry; 3 to 5 moist  
 Chroma: 2 to 4  
 Texture: Loam or silt loam  
 Clay content: 18 to 27 percent  
 Calcium carbonate equivalent: 5 to 10 percent  
 Reaction: pH 7.4 to 8.4

*Bw horizon*

Hue: 10YR or 2.5Y  
 Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 to 4  
 Texture: Silt loam or silty clay loam  
 Clay content: 18 to 35 percent  
 Effervescence: Slightly or strongly  
 Calcium carbonate equivalent: 5 to 10 percent  
 Reaction: pH 7.4 to 8.4

*Bk1 horizon*

Hue: 10YR or 2.5Y  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Texture: Silt loam or silty clay loam  
 Clay content: 18 to 35 percent  
 Calcium carbonate equivalent: 5 to 15 percent  
 Electrical conductivity: 2 to 8 mmhos/cm  
 Sodium adsorption ratio: 1 to 13  
 Effervescence: Strongly or violently  
 Reaction: pH 7.9 to 9.0

*Bk2 horizon*

Hue: 10YR or 2.5Y  
 Value: 5 to 8 dry; 4 to 7 moist  
 Chroma: 2 to 4  
 Texture: Silt loam or silty clay loam  
 Clay content: 18 to 35 percent  
 Calcium carbonate equivalent: 5 to 15 percent  
 Electrical conductivity: 2 to 8 mmhos/cm  
 Sodium adsorption ratio: 1 to 13  
 Effervescence: Strongly or violently  
 Reaction: pH 7.9 to 9.0

*BC horizon*

Hue: 10YR or 2.5Y  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Texture: Loam, silt loam, or silty clay loam  
 Clay content: 18 to 35 percent  
 Electrical conductivity: 2 to 8 mmhos/cm  
 Sodium adsorption ratio: 1 to 13

Effervescence: Strongly or violently  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.9 to 9.0

**93A—Lonna silt loam,  
 0 to 2 percent slopes**

**Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 2 percent  
*Mean annual precipitation:* 10 to 14 inches

**Composition**

**Major Components**

Lonna and similar soils: 85 percent

**Minor Components**

Alona and similar soils: 0 to 5 percent  
 Yamacall and similar soils: 0 to 4 percent  
 Soils with darker-colored surface layers: 0 to 4 percent  
 Soils that are noncalcareous: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**93C—Lonna silt loam,  
 2 to 8 percent slopes**

**Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

**Composition**

**Major Components**

Lonna and similar soils: 85 percent

**Minor Components**

Cambeth and similar soils: 0 to 5 percent  
 Yamacall and similar soils: 0 to 5 percent  
 Soils that are noncalcareous: 0 to 3 percent  
 Soils with darker-colored surface layers: 0 to 2 percent

**Major Component Description**

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**193C—Lonna-Cambeth silt loams, 2 to 8 percent slopes****Setting***Landform:*

- Lonna—Sedimentary plains
- Cambeth—Sedimentary plains

*Position on landform:*

- Lonna—Backslopes and footslopes
- Cambeth—Backslopes and shoulders

*Slope:*

- Lonna—2 to 8 percent
- Cambeth—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Lonna and similar soils: 50 percent  
 Cambeth and similar soils: 35 percent

**Minor Components**

Cabbart and similar soils: 0 to 3 percent  
 Yamacall and similar soils: 0 to 3 percent  
 Soils with darker-colored surface layers: 0 to 3 percent  
 Soils with slopes more than 8 percent: 0 to 3 percent  
 Soils with noncalcareous surface layers: 0 to 3 percent

**Major Component Description****Lonna**

*Surface layer texture:* Silt loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.8 inches

**Cambeth**

*Surface layer texture:* Silt loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**193D—Lonna-Cambeth-Cabbart silt loams, 4 to 12 percent slopes****Setting***Landform:*

- Lonna—Sedimentary plains and hills
- Cambeth—Sedimentary plains and hills
- Cabbart—Sedimentary plains and hills

*Position on landform:*

- Lonna—Backslopes and footslopes
- Cambeth—Backslopes
- Cabbart—Shoulders and summits

*Slope:*

- Lonna—4 to 12 percent
- Cambeth—4 to 12 percent
- Cabbart—4 to 12 percent

*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Lonna and similar soils: 40 percent  
 Cambeth and similar soils: 35 percent  
 Cabbart and similar soils: 15 percent

**Minor Components**

Delpoint and similar soils: 0 to 3 percent

Very shallow loamy soils: 0 to 3 percent

Yamacall and similar soils: 0 to 2 percent

Soils with slopes more than 12 percent: 0 to 1 percent

Soils with darker-colored surface layers: 0 to 1 percent

**Major Component Description****Lonna**

*Surface layer texture:* Silt loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.8 inches

**Cambeth**

*Surface layer texture:* Silt loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.7 inches

**Cabbart**

*Surface layer texture:* Silt loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**293C—Lonna-Cabbart silt loams,  
2 to 8 percent slopes****Setting***Landform:*

- Lonna—Sedimentary plains
- Cabbart—Sedimentary plains

*Position on landform:*

- Lonna—Backslopes and footslopes
- Cabbart—Shoulders and summits

*Slope:*

- Lonna—2 to 8 percent
- Cabbart—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Lonna and similar soils: 65 percent

Cabbart and similar soils: 20 percent

**Minor Components**

Cambeth and similar soils: 0 to 3 percent

Yamacall and similar soils: 0 to 3 percent

Very shallow loamy soils: 0 to 3 percent

Moderately saline soils: 0 to 3 percent

Noncalcareous soils: 0 to 2 percent

Soils with darker-colored surface layers: 0 to 1 percent

**Major Component Description****Lonna**

*Surface layer texture:* Silt loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.8 inches

**Cabbart**

*Surface layer texture:* Silt loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 293D—Lonna-Cabbart silt loams, 8 to 25 percent slopes

### Setting

*Landform:*

- Lonna—Hills
- Cabbart—Hills

*Position on landform:*

- Lonna—Backslopes and footslopes
- Cabbart—Shoulders and summits

*Slope:*

- Lonna—8 to 15 percent
- Cabbart—8 to 25 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Lonna and similar soils: 50 percent

Cabbart and similar soils: 35 percent

#### Minor Components

Cambeth and similar soils: 0 to 3 percent

Yamacall and similar soils: 0 to 3 percent

Very shallow loamy soils: 0 to 3 percent

Moderately saline soils: 0 to 3 percent

Soils that are noncalcareous: 0 to 2 percent

Soils with darker-colored surface layers: 0 to 1 percent

### Major Component Description

#### Lonna

*Surface layer texture:* Silt loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.8 inches

#### Cabbart

*Surface layer texture:* Silt loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 393E—Lonna-Cambeth-Cabbart silt loams, 12 to 25 percent slopes

### Setting

*Landform:*

- Lonna—Alluvial fans
- Cambeth—Hills
- Cabbart—Hills

*Position on landform:*

- Lonna—Backslopes and shoulders
- Cambeth—Backslopes and shoulders
- Cabbart—Shoulders and summits

*Slope:*

- Lonna—12 to 25 percent
- Cambeth—12 to 25 percent
- Cabbart—12 to 25 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Lonna and similar soils: 40 percent

Cambeth and similar soils: 25 percent

Cabbart and similar soils: 20 percent

#### Minor Components

Yamacall and similar soils: 0 to 4 percent

Very shallow loamy soils: 0 to 4 percent

Soils with slopes less than 12 percent: 0 to 4 percent

Soils with darker-colored surface layers: 0 to 3 percent

### Major Component Description

#### Lonna

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.8 inches

### **Cambeth**

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 6.6 inches

### **Cabbart**

*Surface layer texture:* Loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## **Marmarth Series**

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Moderate (0.6 to 2.0 inches/hour)

*Landform:* Sedimentary plains

*Parent material:* Semiconsolidated, loamy sedimentary beds

*Slope range:* 2 to 8 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-loamy, mixed Aridic Argiborolls

## **Typical Pedon**

Marmarth loam, 2 to 8 percent slopes, in an area of rangeland, 1,000 feet south and 2,000 feet east of the northwest corner of sec. 27, T. 7 N., R. 61 E.

A—0 to 8 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; thin and very thin platy structure parting to moderate medium and fine granular; hard, very friable,

slightly sticky, slightly plastic; many very fine roots; many very fine tubular pores; slightly acid; clear smooth boundary.

Bt1—8 to 14 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; strong coarse prismatic structure parting to strong coarse and medium subangular blocky; very hard, firm, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; continuous faint clay films on faces of peds and in pores; neutral; gradual wavy boundary.

Bt2—14 to 24 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; strong coarse and medium prismatic structure; very hard, firm, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; continuous faint clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bk1—24 to 30 inches; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/4) moist; moderate coarse prismatic structure parting to weak coarse and medium subangular blocky; hard, firm, moderately sticky, moderately plastic; common very fine roots; common very fine pores; common fine masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk2—30 to 36 inches; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/4) moist; moderate coarse prismatic structure parting to weak coarse and medium subangular blocky; hard, firm, slightly sticky, slightly plastic; few very fine roots; few very fine tubular pores; many fine and very fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Cr—36 to 60 inches; pale olive (5Y 6/3) semiconsolidated, loamy sedimentary beds that crush to a sandy loam; olive (5Y 4/3) moist.

## **Range in Characteristics**

*Thickness of the mollic epipedon:* 7 to 16 inches

*Depth to the Bk horizon:* 12 to 24 inches

*Depth to the Cr horizon:* 20 to 40 inches

### *A horizon*

Value: 3 to 5 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Reaction: pH 6.1 to 7.3

### *Bt horizons*

Hue: 10YR or 2.5Y

Value: 3 to 6 moist

Chroma: 2 to 4

Texture: Loam, clay loam, or sandy clay loam  
Clay content: 18 to 35 percent  
Reaction: pH 6.1 to 7.8

**Bk horizons**

Hue: 2.5Y or 5Y  
Value: 5 to 7 dry; 4 to 6 moist  
Chroma: 2 to 4  
Texture: Loam, fine sandy loam, or clay loam  
Clay content: 15 to 30 percent  
Calcium carbonate equivalent: 5 to 15 percent  
Reaction: pH 7.4 to 8.4

**Cr horizon**

Material: Soft sandstone or stratified soft sandstone and siltstone

## 81C—Marmarth loam, 2 to 8 percent slopes

**Setting**

*Landform:* Sedimentary plains  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Marmarth and similar soils: 85 percent

**Minor Components**

Cabbart and similar soils: 0 to 3 percent  
Delpoint and similar soils: 0 to 3 percent  
Alona and similar soils: 0 to 3 percent  
Soils with lighter colored surface layers: 0 to 3 percent  
Moderately deep silt loam soils: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Marvan Series**

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Permeability:* Very slow (<0.06 inch/hour)  
*Landform:* Alluvial fans and stream terraces  
*Parent material:* Alluvium  
*Slope range:* 0 to 8 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine, montmorillonitic, frigid Sodic Haplusterts

**Typical Pedon**

Marvan silty clay, 0 to 2 percent slopes, in an area of rangeland, 1,200 feet south and 300 feet east of the northwest corner of sec. 10, T. 8 N., R. 59 E.

A—0 to 4 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate very fine granular structure; very hard, friable, very sticky, very plastic; many very fine and fine roots; moderately alkaline; gradual wavy boundary.

Bss—4 to 14 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; strong very fine and fine subangular blocky structure; extremely hard, firm, very sticky, very plastic; many very fine roots; few faint slickensides; disseminated lime; strongly effervescent; strongly alkaline; gradual wavy boundary.

Bssy—14 to 29 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; strong medium and fine subangular blocky structure; extremely hard, firm, very sticky, very plastic; common very fine roots; few distinct slickensides; many fine gypsum crystals; disseminated lime; strongly effervescent; strongly alkaline; gradual wavy boundary.

Bnssyz—29 to 60 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; extremely hard, firm, very sticky, very plastic; common very fine roots; common distinct slickensides; common fine and medium gypsum crystals and other salts; disseminated lime; strongly effervescent; strongly alkaline.

**Range in Characteristics**

*Soil temperature:* 42 to 47 degrees F  
*Moisture control section:* Between of 4 and 12 inches; dry all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher.  
*Depth to the Bssy horizon:* 10 to 20 inches

*Other features:* When dry, the soil has  $\frac{1}{4}$ - to 1-inch cracks that extend to a depth of about 20 inches.

*A horizon*

Hue: 2.5Y or 5Y  
 Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 to 4  
 Clay content: 40 to 60 percent  
 Electrical conductivity: 0 to 4 mmhos/cm  
 Sodium adsorption ratio: 0 to 4  
 Calcium carbonate equivalent: 1 to 5 percent  
 Reaction: pH 7.4 to 8.4

*Bss horizon*

Hue: 2.5Y or 5Y  
 Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 to 4  
 Texture: Clay or silty clay  
 Clay content: 45 to 60 percent  
 Electrical conductivity: 2 to 4 mmhos/cm  
 Sodium adsorption ratio: 4 to 13  
 Calcium carbonate equivalent: 1 to 10 percent  
 Reaction: pH 7.9 to 9.0

*Bssy horizon*

Hue: 2.5Y or 5Y  
 Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 to 4  
 Texture: Clay or silty clay  
 Clay content: 45 to 60 percent  
 Gypsum: 1 to 5 percent  
 Electrical conductivity: 2 to 4 mmhos/cm  
 Sodium adsorption ratio: 4 to 13  
 Calcium carbonate equivalent: 1 to 10 percent  
 Reaction: pH 7.9 to 9.0

*Bnssyz horizon*

Hue: 2.5Y or 5Y  
 Value: 5 or 6 dry; 4 or 5 moist  
 Chroma: 2 to 4  
 Texture: Clay or silty clay  
 Clay content: 45 to 60 percent  
 Gypsum: 1 to 5 percent  
 Electrical conductivity: 4 to 16 mmhos/cm  
 Sodium adsorption ratio: 13 to 38  
 Calcium carbonate equivalent: 1 to 10 percent  
 Reaction: pH 7.9 to 9.0

**89A—Marvan silty clay,  
 0 to 2 percent slopes**

**Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 2 percent  
*Mean annual precipitation:* 10 to 14 inches

**Composition**

**Major Components**

Marvan and similar soils: 85 percent

**Minor Components**

Orinoco and similar soils: 0 to 3 percent  
 Soils that are noncalcareous: 0 to 3 percent  
 Soils that are nonsaline: 0 to 3 percent  
 Soils that are nonsodic: 0 to 3 percent  
 Areas barren of vegetation: 0 to 2 percent  
 Poorly drained and ponded soils: 0 to 1 percent

**Major Component Description**

*Surface layer texture:* Silty clay  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**89C—Marvan silty clay,  
 2 to 8 percent slopes**

**Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

**Composition**

**Major Components**

Marvan and similar soils: 85 percent

**Minor Components**

Orinoco and similar soils: 0 to 3 percent  
 Soils that are noncalcareous: 0 to 3 percent  
 Soils that are nonsaline: 0 to 3 percent  
 Soils that are nonsodic: 0 to 3 percent  
 Areas barren of vegetation: 0 to 2 percent  
 Poorly drained soils: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Silty clay  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### M-W—Miscellaneous water

#### Composition

##### Major Components

Miscellaneous water: 100 percent

#### Major Component Description

*Definition:* Water in areas such as sewage lagoons, industrial waste pits, and fish hatcheries.

### Neldore Series

*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Permeability:* Slow (0.06 to 0.2 inch/hour)  
*Landform:* Sedimentary plains and hills  
*Parent material:* Semiconsolidated shale  
*Slope range:* 4 to 45 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Clayey, montmorillonitic, nonacid, frigid, shallow Aridic Ustorthents

#### Typical Pedon

Neldore clay, in an area of Neldore-Bascovy clays, 4 to 15 percent slopes, in an area of rangeland, 50 feet north and 25 feet west of the southeast corner of sec. 13, T. 7 N., R. 59 E.

A—0 to 2 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium

platy structure parting to strong fine granular; slightly hard, firm, very sticky, very plastic; many fine roots; slightly alkaline; abrupt smooth boundary.

C1—2 to 8 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong medium subangular blocky structure; very hard, very firm, very sticky, very plastic; many very fine and fine roots; neutral; clear smooth boundary.

C2—8 to 14 inches; light brownish gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) moist; massive; very hard, very firm, very sticky, very plastic; common fine roots; 65 percent soft shale fragments; moderately acid; clear smooth boundary.

Cr—14 to 60 inches; light gray (2.5Y 7/1); semiconsolidated shale, gray (2.5Y 5/1) moist.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or above.

*Depth to the Cr horizon:* 10 to 20 inches

#### A horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 1 or 2

Clay content: 40 to 50 percent

Reaction: pH 5.6 to 7.8

#### C1 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 1 or 2

Texture: Clay or silt clay

Clay content: 40 to 60 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 5.6 to 7.8

#### C2 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 1 or 2

Texture: Clay or silty clay

Clay content: 40 to 60 percent

Electrical conductivity: 0 to 4 mmhos/cm

Content of rock fragments: 65 to 75 percent soft shale fragments

Reaction: pH 5.6 to 7.8

*Cr horizon*

Material: The shale fragments are extremely hard or very hard when dry and extremely firm or very firm when moist.

Reaction: pH 5.1 to 7.3

### 58D—Neldore-Rock outcrop complex, 4 to 15 percent slopes

#### Setting

*Landform:*

- Neldore—Sedimentary plains and hills
- Rock outcrop—Hills

*Slope:* 4 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Neldore and similar soils: 50 percent  
Rock outcrop: 35 percent

##### Minor Components

Bascovy and similar soils: 0 to 3 percent  
Very shallow clayey soils: 0 to 3 percent  
Very shallow loamy soils: 0 to 3 percent  
Shallow acid soils: 0 to 2 percent  
Moderately saline soils: 0 to 2 percent  
Moderately sodic soils: 0 to 2 percent

#### Major Component Description

##### Neldore

*Surface layer texture:* Clay

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.2 inches

##### Rock outcrop

*Definition:* Mainly consolidated shale.

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 58E—Neldore-Rock outcrop complex, 15 to 45 percent slopes

#### Setting

*Landform:*

- Neldore—Hills
- Rock outcrop—Hills

*Slope:* 15 to 45 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Neldore and similar soils: 45 percent  
Rock outcrop: 40 percent

##### Minor Components

Bascovy and similar soils: 0 to 3 percent  
Very shallow clayey soils: 0 to 3 percent  
Very shallow loamy soils: 0 to 3 percent  
Shallow acid soils: 0 to 2 percent  
Moderately saline soils: 0 to 2 percent  
Moderately sodic soils: 0 to 2 percent

#### Major Component Description

##### Neldore

*Surface layer texture:* Clay

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.7 inches

##### Rock outcrop

*Definition:* Mainly consolidated shale.

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 158D—Neldore clay, 4 to 15 percent slopes

#### Setting

*Landform:* Sedimentary plains and hills

*Slope:* 4 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

## Composition

### Major Components

Neldore and similar soils: 85 percent

### Minor Components

Yawdim and similar soils: 0 to 3 percent  
 Bascovy and similar soils: 0 to 3 percent  
 Very shallow clayey soils: 0 to 3 percent  
 Soils with slopes more than 15 percent: 0 to 3 percent  
 Cabbart and similar soils: 0 to 2 percent  
 Shallow acidic soils: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Clay  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 358D—Neldore-Bascovy clays, 4 to 15 percent slopes

### Setting

#### *Landform:*

- Neldore—Sedimentary plains and hills
- Bascovy—Sedimentary plains and hills

#### *Position on landform:*

- Neldore—Shoulders and summits
- Bascovy—Backslopes and shoulders

#### *Slope:*

- Neldore—4 to 15 percent
- Bascovy—4 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Neldore and similar soils: 45 percent  
 Bascovy and similar soils: 40 percent

### Minor Components

Yawdim and similar soils: 0 to 3 percent  
 Cabbart and similar soils: 0 to 3 percent  
 Moderately saline soils: 0 to 3 percent  
 Shallow acid soils: 0 to 3 percent  
 Soils with calcareous surface layers: 0 to 2 percent  
 Poorly drained and ponded soils: 0 to 1 percent

### Major Component Description

#### Neldore

*Surface layer texture:* Clay  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.0 inches

#### Bascovy

*Surface layer texture:* Clay  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 3.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Orinoco Series

*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Permeability:* Slow (0.06 to 0.2 inch/hour)  
*Landform:* Sedimentary plains and hills  
*Parent material:* Semiconsolidated shale  
*Slope range:* 4 to 15 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine, montmorillonitic, (calcareous), frigid Aridic Ustorthents

### Typical Pedon

Orinoco-Yawdim silty clay loams, 4 to 15 percent slopes, in an area of rangeland, 2,600 feet north and 1,500 feet east of the southwest corner of sec. 23, T. 7 N., R. 56 E.

A—0 to 3 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak thin platy structure parting to moderate fine granular; slightly hard, very friable, moderately sticky, moderately plastic; common very fine roots; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bw—3 to 8 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; moderate medium and fine subangular blocky structure; hard, firm, very sticky, very plastic; common very fine roots; many very fine tubular pores; disseminated lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bky1—8 to 19 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, very sticky, very plastic; common very fine roots; many very fine tubular pores; disseminated lime; many fine masses of lime; common very fine gypsum crystals; violently effervescent; moderately alkaline; gradual wavy boundary.

Bky2—19 to 34 inches; grayish brown (10YR 5/2) silty clay, dark brown (10YR 4/1) moist; massive; very hard, very firm, very sticky, very plastic; few very fine roots; few very fine tubular pores; disseminated lime; few fine masses of lime; many fine gypsum crystals; slightly effervescent; moderately alkaline; gradual smooth boundary.

Cr—34 to 60 inches; gray (10YR 5/1) semiconsolidated shale, dark gray (10YR 4/1) moist.

### Range in Characteristics

*Soil temperature:* 41 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when soil temperature at 20 inches is 41 degrees F.

*Depth to the Bky horizon:* 6 to 10 inches

*Depth to the Cr horizon:* 20 to 40 inches

#### A horizon

Value: 5 or 6 dry; 4 or 5 moist  
Clay content: 30 to 40 percent  
Content of rock fragments: 0 to 5 percent pebbles  
Reaction: pH 7.4 to 8.4

#### Bw horizon

Value: 5 or 6 dry; 4 or 5 moist  
Clay content: 35 to 40 percent  
Reaction: pH 7.9 to 8.4

#### Bky horizons

Hue: 10YR or 2.5Y  
Value: 5 or 6 dry; 4 or 5 moist  
Chroma: 1 or 2  
Texture: Silty clay loam, clay, or silty clay  
Clay content: 35 to 45 percent  
Content of rock fragments: 0 to 5 percent pebbles  
Electrical conductivity: 4 to 16 mmhos/cm  
Sodium adsorption ratio: 5 to 30  
Calcium carbonate equivalent: 5 to 15 percent  
Gypsum: 1 to 5 percent  
Reaction: pH 7.4 to 8.4

### 153D—Orinoco-Yawdim silty clay loams, 4 to 15 percent slopes

#### Setting

##### Landform:

- Orinoco—Sedimentary plains and hills
- Yawdim—Sedimentary plains and hills

##### Position on landform:

- Orinoco—Backslopes
- Yawdim—Summits

##### Slope:

- Orinoco—4 to 15 percent
- Yawdim—4 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Orinoco and similar soils: 50 percent  
Yawdim and similar soils: 35 percent

##### Minor Components

Very shallow loamy soils: 0 to 3 percent  
Very shallow clayey soils: 0 to 3 percent  
Abor and similar soils: 0 to 3 percent  
Soils with noncalcareous surface layers: 0 to 3 percent  
Strongly sodic soils: 0 to 2 percent  
Areas barren of vegetation: 0 to 1 percent

#### Major Component Description

##### Orinoco

*Surface layer texture:* Silty clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum

*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 4.5 inches

**Yawdim**

*Surface layer texture:* Silty clay loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**253D—Orinoco-Weingart complex,  
4 to 15 percent slopes****Setting**

*Landform:*  
 • Orinoco—Sedimentary plains and hills  
 • Weingart—Sedimentary plains and hills  
*Slope:*  
 • Orinoco—4 to 15 percent  
 • Weingart—4 to 15 percent  
*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Orinoco and similar soils: 45 percent  
 Weingart and similar soils: 40 percent

**Minor Components**

Yawdim and similar soils: 0 to 3 percent  
 Cabbart and similar soils: 0 to 3 percent  
 Abor and similar soils: 0 to 3 percent  
 Strongly saline soils: 0 to 3 percent  
 Areas barren of vegetation: 0 to 2 percent  
 Soils with slopes more than 15 percent: 0 to 1 percent

**Major Component Description****Orinoco**

*Surface layer texture:* Silty clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 3.4 inches

**Weingart**

*Surface layer texture:* Clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 3.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Pachel Series**

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate (0.6 to 2.0 inches/hour)  
*Landform:* Alluvial fans and stream terraces  
*Parent material:* Loamy alluvium  
*Slope range:* 0 to 4 percent  
*Annual precipitation:* 15 to 19 inches

**Taxonomic Class:** Fine-loamy, mixed Pachic Argiborolls

**Typical Pedon**

Pachel loam, 0 to 4 percent slopes, in an area of cropland, 2,300 feet south and 2,000 feet east of the northwest corner of sec. 4, T. 9 N., R. 60 E.

Ap—0 to 6 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; moderate medium and fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; 5 percent pebbles; slightly acid; abrupt smooth boundary.

Bt1—6 to 13 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, moderately sticky, moderately plastic; few very fine roots; few very fine tubular pores; common faint clay films on faces of peds and in pores; 5 percent pebbles; neutral; gradual wavy boundary.

Bt2—13 to 22 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate coarse and medium prismatic structure; hard, firm, very sticky, very plastic; few very fine roots; few very fine tubular pores; many faint clay films on faces of peds and in pores; 10 percent pebbles; slightly alkaline; clear smooth boundary.

Bk—22 to 60 inches; pale brown (10YR 6/3) very gravelly sandy clay loam, brown (10YR 4/3) moist; weak fine granular structure; hard, firm, slightly sticky, slightly plastic; few very fine roots; 10 percent cobbles and 40 percent pebbles; common faint lime coatings on some of the cobbles and pebbles; disseminated lime; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Thickness of the mollic epipedon:* 16 to 34 inches; may include part or all of the Bt horizon

*Depth to the Bk horizon:* 16 to 34 inches; mainly 20 to 28 inches

#### Ap horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 to 3

Clay content: 18 to 25 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.3

#### Bt1 horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 to 3

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bt2 horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 to 3

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bk horizon

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Loam, clay loam, or sandy clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 25 to 75 percent—0 to 15 percent cobbles; 25 to 60 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

## 135B—Pachel loam, 0 to 4 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 4 percent

*Mean annual precipitation:* 15 to 19 inches

### Composition

#### Major Components

Pachel and similar soils: 85 percent

#### Minor Components

Farnuf and similar soils: 0 to 5 percent

Reeder and similar soils: 0 to 5 percent

Daglum and similar soils: 0 to 3 percent

Farnuf soils with slopes more than 4 percent: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**Parchin Series**

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Slow (0.06 to 0.2 inch/hour)

*Landform:* Sedimentary plains

*Parent material:* Semiconsolidated, loamy sedimentary beds

*Slope range:* 2 to 8 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-loamy, mixed Borollic Natrargids

**Typical Pedon**

Parchin fine sandy loam, 2 to 8 percent slopes, in an area of rangeland, 2,100 feet north and 1,600 feet west of the southeast corner of sec. 6, T. 5 N., R. 60 E.

A—0 to 4 inches; grayish brown (2.5Y 5/2) fine sandy loam, very dark grayish brown (2.5Y 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine roots; neutral; abrupt smooth boundary.

E—4 to 9 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak thin platy structure parting to weak fine granular; soft, very friable, nonsticky, nonplastic; common very fine roots; neutral; abrupt smooth boundary.

B<sub>tn</sub>—9 to 20 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; strong coarse and medium columnar structure parting to strong medium subangular blocky; very hard, firm, moderately sticky, moderately plastic; common very fine roots along surfaces of peds; many very fine tubular pores; common faint clay films on faces of peds and in pores; moderately alkaline; gradual wavy boundary.

B<sub>k</sub>—20 to 28 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (10YR 4/2) moist; strong medium subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; few very fine roots; many very fine tubular pores; common very fine masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cr—28 to 60 inches; light brownish gray (2.5Y 6/2) semiconsolidated loamy sedimentary beds that

crush to fine sandy loam, grayish brown (2.5Y 5/2) moist.

**Range in Characteristics**

*Depth to the B<sub>k</sub> horizon:* 13 to 25 inches

*Depth to the Cr horizon:* 20 to 40 inches

*Taxonomic features:* The Parchin soil is a taxadjunct to the series and classifies as fine-loamy, mixed Typic Natriboralfs. Use and management are similar.

*Other features:* Fine threads of gypsum or other salts are present in the lower part of the horizon in some pedons. Pedons with sodium adsorption ratios of less than 13 have more exchangeable magnesium plus sodium than calcium plus exchangeable acidity at pH 8.2. Some pedons contain few or common threads and nests of gypsum and other salts.

**A horizon**

Hue: 10YR or 2.5Y

Value: 5 to 6 dry; 3 or 4 moist

Chroma: 2 or 3

Clay content: 10 to 20 percent

Reaction: pH 5.6 to 7.3

**E horizon**

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 or 3

Clay content: 10 to 20 percent

Reaction: pH 5.6 to 7.3

**B<sub>tn</sub> horizon**

Hue: 10YR or 2.5Y

Value: 5 to 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Clay loam, sandy clay loam, or loam

Clay content: 25 to 34 percent

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 10 to 20

Reaction: pH 7.9 to 9.0

**B<sub>k</sub> horizon**

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Clay loam, sandy clay loam, or loam

Clay content: 20 to 30 percent

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 13 to 30

Calcium carbonate equivalent: 5 to 15 percent  
Reaction: pH greater than 7.8

### **21C—Parchin fine sandy loam, 2 to 8 percent slopes**

#### **Setting**

*Landform:* Sedimentary plains  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Parchin and similar soils: 85 percent

##### **Minor Components**

Areas barren of vegetation: 0 to 3 percent  
Shallow saline soils: 0 to 3 percent  
Very deep saline soils: 0 to 3 percent  
Moderately deep clayey soils: 0 to 3 percent  
Nonsaline and nonsodic soils: 0 to 3 percent

#### **Major Component Description**

*Surface layer texture:* Fine sandy loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 4.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **121C—Parchin-Bullock complex, 2 to 8 percent slopes**

#### **Setting**

*Landform:*

- Parchin—Sedimentary plains
- Bullock—Sedimentary plains

*Slope:*

- Parchin—2 to 8 percent
- Bullock—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Parchin and similar soils: 50 percent  
Bullock and similar soils: 35 percent

##### **Minor Components**

Alona and similar soils: 0 to 3 percent  
Shallow saline soils: 0 to 3 percent  
Soils with slopes more than 8 percent: 0 to 3 percent  
Bascovy and similar soils: 0 to 2 percent  
Soils with darker-colored surface layers: 0 to 2 percent  
Bonfri and similar soils: 0 to 2 percent

#### **Major Component Description**

##### **Parchin**

*Surface layer texture:* Fine sandy loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 4.0 inches

##### **Bullock**

*Surface layer texture:* Clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Salt affected:* Saline within 30 inches  
*Sodium affected:* Sodic within 30 inches  
*Available water capacity:* Mainly 3.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

#### **Prego Series**

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderately rapid (2.0 to 6.0 inches/hour)  
*Landform:* Relict stream terraces  
*Parent material:* Alluvium

*Slope range:* 2 to 15 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Coarse-loamy, mixed Aridic  
 Argiborolls

### Typical Pedon

Prego sandy loam, 2 to 15 percent slopes, in an area of rangeland, 1,900 feet south and 500 feet west of the northeast corner of sec. 14, T. 4 N., R. 59 E.

A—0 to 3 inches; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky, nonplastic; many very fine and common fine roots; neutral; abrupt wavy boundary.

Bt1—3 to 9 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; clay bridging between mineral grains; neutral; abrupt wavy boundary.

Bt2—9 to 16 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; few faint clay films on faces of pedis; clay bridging between mineral grains; neutral; abrupt wavy boundary.

2C—16 to 60 inches; brown (10YR 5/3) sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; neutral.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 12 and 35 inches; dry in some part of the moisture control section 60 percent or more of the time that the soil temperature at 20 inches exceeds 51 degrees F.

*Thickness of the mollic epipedon:* 7 to 10 inches (includes part of the Bt horizon)

*Depth to the 2C horizon:* 10 to 20 inches

#### A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 8 to 14 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.3

#### Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture: Sandy loam or fine sandy loam

Clay content: 14 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.3

#### 2C horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Sand or loamy sand

Clay content: 1 to 8 percent

Content of rock fragments: 5 to 35 percent pebbles

Reaction: pH 6.1 to 7.3

### 48D—Prego sandy loam, 2 to 15 percent slopes

#### Setting

*Landform:* Relict stream terraces

*Slope:* 2 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Prego and similar soils: 85 percent

##### Minor Components

Soils with slopes more than 15 percent: 0 to 3 percent

Marmarth and similar soils: 0 to 3 percent

Soils with darker-colored surface layers: 0 to 3 percent

Soils with very gravelly surface layers: 0 to 3 percent

Busby and similar soils: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Sandy loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Reeder Series

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Moderate (0.6 to 2.0 inches/hour)

*Landform:* Sedimentary plains and hills

*Parent material:* Semiconsolidated, interbedded sandstone and shale

*Slope range:* 2 to 35 percent

*Annual precipitation:* 15 to 19 inches

**Taxonomic Class:** Fine-loamy, mixed Typic Argiborolls

### Typical Pedon

Reeder loam, 2 to 8 percent slopes, in an area of cropland, 1,400 feet south and 2,600 feet west of the northeast corner of sec. 15, T. 9 N., R. 60 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; hard, firm, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; neutral; gradual wavy boundary.

Bt1—6 to 14 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; common faint clay films on faces of peds and in pores; neutral; gradual wavy boundary.

Bt2—14 to 19 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; very hard, very firm, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; common faint clay films on faces of peds and in pores; slightly alkaline; gradual wavy boundary.

Bk—19 to 31 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; common very fine roots; many very fine tubular pores; many fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Cr—31 to 60 inches; light brownish gray (10YR 6/2) semiconsolidated interbedded sandstone and

shale that crush to loam, dark grayish brown (10YR 4/2) moist.

### Range in Characteristics

*Thickness of the mollic epipedon:* 7 to 16 inches

*Depth to the Bk horizon:* 12 to 24 inches

*Depth to the Cr horizon:* 20 to 40 inches

*Other features:* Some pedons are effervescent in the lower part of the Bt horizon.

#### Ap horizon

Hue: 10YR or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.3

#### Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bk horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

## 42C—Reeder loam, 2 to 8 percent slopes

### Setting

*Landform:* Sedimentary plains

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 15 to 19 inches

### Composition

#### Major Components

Reeder and similar soils: 85 percent

#### Minor Components

Deep loamy soils: 0 to 4 percent

Cabba and similar soils: 0 to 3 percent

Soils with slopes more than 8 percent: 0 to 3 percent

Moderately saline soils: 0 to 3 percent

Moderately sodic soils: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 142D—Reeder-Cabba loams, 4 to 15 percent slopes

### Setting

*Landform:*

- Reeder—Sedimentary plains and hills
- Cabba—Sedimentary plains and hills

*Position on landform:*

- Reeder—Backslopes and shoulders
- Cabba—Shoulders and summits

*Slope:*

- Reeder—4 to 15 percent
- Cabba—4 to 15 percent

*Mean annual precipitation:* 15 to 19 inches

### Composition

#### Major Components

Reeder and similar soils: 60 percent  
 Cabba and similar soils: 25 percent

#### Minor Components

Very shallow loamy soils: 0 to 3 percent  
 Wayden and similar soils: 0 to 3 percent  
 Farnuf and similar soils: 0 to 3 percent  
 Soils with slopes less than 4 percent: 0 to 3 percent  
 Daglum and similar soils: 0 to 3 percent

### Major Component Description

#### Reeder

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum  
*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.1 inches

#### Cabba

*Surface layer texture:* Loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 142E—Reeder-Cabba loams, 15 to 45 percent slopes

### Setting

*Landform:*

- Reeder—Hills
- Cabba—Hills

*Position on landform:*

- Reeder—Backslopes and shoulders
- Cabba—Shoulders and summits

*Slope:*

- Reeder—15 to 35 percent
- Cabba—15 to 45 percent

*Mean annual precipitation:* 15 to 19 inches

### Composition

#### Major Components

Reeder and similar soils: 50 percent  
 Cabba and similar soils: 35 percent

#### Minor Components

Very shallow loamy soils: 0 to 4 percent  
 Wayden and similar soils: 0 to 4 percent  
 Farnuf and similar soils: 0 to 4 percent  
 Soils with slopes less than 15 percent: 0 to 3 percent

### Major Component Description

#### Reeder

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.1 inches

### **Cabba**

*Surface layer texture:* Loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 1.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## **242D—Reeder-Dast complex, 4 to 15 percent slopes**

### **Setting**

*Landform:*

- Reeder—Sedimentary plains and hills
- Dast—Sedimentary plains and hills

*Position on landform:*

- Reeder—Backslopes and shoulders
- Dast—Shoulders and summits

*Slope:*

- Reeder—4 to 15 percent
- Dast—4 to 15 percent

*Mean annual precipitation:* 15 to 19 inches

### **Composition**

#### **Major Components**

Reeder and similar soils: 45 percent

Dast and similar soils: 40 percent

#### **Minor Components**

Farnuf and similar soils: 0 to 4 percent

Cabba and similar soils: 0 to 3 percent

Soils with slopes more than 15 percent: 0 to 3 percent

Soils with slopes less than 4 percent: 0 to 3 percent

Barkof and similar soils: 0 to 2 percent

## **Major Component Description**

### **Reeder**

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.8 inches

### **Dast**

*Surface layer texture:* Sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## **Regent Series**

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Slow (0.06 to 0.2 inch/hour)

*Landform:* Sedimentary plains

*Parent material:* Residuum weathered from semiconsolidated shale

*Slope range:* 2 to 8 percent

*Annual precipitation:* 15 to 19 inches

**Taxonomic Class:** Fine, montmorillonitic Typic Argiborolls

### **Typical Pedon**

Regent clay loam, 2 to 8 percent slopes, in an area of cropland, 2,500 feet north and 2,500 feet east of the southwest corner of sec. 1, T. 9 N., R. 60 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2)

moist; weak medium subangular blocky structure parting to moderate fine granular; hard, firm, moderately sticky, moderately plastic; many fine roots; many very fine pores; neutral; clear smooth boundary.

Bt1—6 to 12 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky, very plastic; many fine roots; common very fine pores; common distinct clay films on faces of peds and in pores; slightly alkaline; clear wavy boundary.

Bt2—12 to 18 inches; light brownish gray (10YR 6/2) silty clay, dark grayish brown (10YR 4/2) moist; strong medium subangular blocky structure; very hard, extremely firm, very sticky, very plastic; common fine roots; common very fine pores; many distinct clay films on faces of peds and in pores; moderately alkaline; gradual wavy boundary.

Bk—18 to 35 inches; light gray (2.5Y 7/2) silty clay loam, light brownish gray (2.5Y 6/2) moist; weak coarse prismatic structure; very hard, very firm, very sticky, very plastic; few very fine roots; common very fine pores; common fine and medium masses of lime; strongly effervescent; moderately alkaline; diffuse irregular boundary.

Cr—35 to 60 inches; light gray (2.5Y 7/2) semiconsolidated shale that crushes to silty clay, light brownish gray (2.5Y 6/2) moist.

### Range in Characteristics

*Thickness of the mollic epipedon:* 7 to 10 inches

*Depth to the Bk horizon:* 14 to 22 inches

*Depth to the Cr horizon:* 20 to 40 inches

*Other features:* Some pedons are effervescent in the lower part of the Bt horizon.

#### Ap horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 27 to 40 percent

Reaction: pH 6.1 to 7.8

#### Bt horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 4 to 6 dry; 2 to 5 moist

Chroma: 2 or 3

Texture: Clay loam, silty clay loam, clay, or silty clay

Clay content: 35 to 50 percent

Reaction: pH 7.4 to 8.4

#### Bk horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 1 to 4

Texture: Silty clay loam, silty clay, clay loam, or clay

Clay content: 35 to 45 percent

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

## 34C—Regent clay loam, 2 to 8 percent slopes

### Setting

*Landform:* Sedimentary plains

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 15 to 19 inches

### Composition

#### Major Components

Regent and similar soils: 85 percent

#### Minor Components

Farnuf and similar soils: 0 to 4 percent

Daglun and similar soils: 0 to 4 percent

Regent and similar soils: 0 to 4 percent

Savage and similar soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Ryell Series

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Permeability:* Moderate to 18 inches (0.6 to 2.0 inches/hour); rapid below (6.0 to 20.0 inches/hour)

*Landform:* Flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 4 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Coarse-loamy over sandy or sandy-skeletal, mixed (calcareous), frigid Aridic Ustifluvents

### Typical Pedon

Ryell fine sandy loam, in an area of Hanly-Ryell fine sandy loams, 0 to 4 percent slopes, in an area of tame pasture, 2,400 feet south and 150 feet west of the northeast corner of sec. 25, T. 4 N., R. 59 E.

Ap—0 to 6 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak thin platy structure parting to weak fine granular; slightly hard, very friable, slightly sticky, nonplastic; many very fine and common fine roots; slightly alkaline; clear smooth boundary.

C1—6 to 18 inches; light brownish gray (10YR 6/2) fine sandy loam, grayish brown (10YR 5/2) moist; moderate coarse subangular blocky structure; slightly hard, very friable, slightly sticky, nonplastic; many very fine roots; strongly effervescent; moderately alkaline; gradual wavy boundary.

2C2—18 to 60 inches; brown (10YR 5/3) stratified extremely gravelly sand and very gravelly sand, (10YR 4/3) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; 50 percent pebbles; slightly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 40 to 47 degrees F

*Moisture control section:* Between 8 and 24 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher.

*Depth to the 2C2 horizon:* 18 to 36 inches

*Ap horizon*

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Clay content: 10 to 20 percent

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 7.4 to 8.4

*C1 horizon*

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 5 percent pebbles

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 7.4 to 8.4

*2C2 horizon*

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Sand or loamy sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 70 percent—0 to 15 percent cobbles; 35 to 55 percent pebbles

Electrical conductivity: 0 to 4 mmhos/cm

Effervescence: Slight or strongly

Reaction: pH 7.4 to 8.4

### Savage Series

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Permeability:* Slow (0.06 to 0.2 inch/hour)

*Landform:* Alluvial fans

*Parent material:* Alluvium

*Slope range:* 0 to 8 percent

*Annual precipitation:* 15 to 19 inches

**Taxonomic Class:** Fine, montmorillonitic Typic Argiborolls

### Typical Pedon

Savage silty clay loam, 2 to 8 percent slopes, in an area of rangeland, 2,100 feet south and 2,400 feet west of the northeast corner of sec. 11, T. 9 N., R. 60 E.

A—0 to 2 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure parting to moderate very fine and fine granular; hard, friable, moderately sticky, moderately plastic; many very fine roots; slightly alkaline; clear smooth boundary.

Bt1—2 to 5 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate coarse and medium prismatic structure; hard, friable, moderately sticky, moderately plastic; many very fine roots; many very fine pores; few faint clay films on faces of peds; slightly alkaline; clear wavy boundary.

Bt2—5 to 15 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; weak coarse prismatic structure parting to strong medium subangular blocky; very hard, very firm, very sticky, very plastic; many very fine roots; many very fine pores; common faint clay films on faces of peds and lining pores; moderately alkaline; clear wavy boundary.

Bk1—15 to 21 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure parting to moderate medium subangular blocky; very hard, very firm, very sticky, very plastic; common very fine roots; many very fine pores; common fine masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk2—21 to 38 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak coarse and medium subangular blocky structure; very hard, very firm, very sticky, very plastic; few very fine roots; many very fine pores; many fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk3—38 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; very hard, very firm, very sticky, very plastic; few very fine roots; common very fine pores; common fine masses of lime; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches; never dry in all parts for more than 30 consecutive days; frozen November through March.

*Thickness of the mollic epipedon:* 7 to 16 inches (may include part of all of the argillic horizon)

*Depth to the Bk horizon:* 12 to 30 inches

#### A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.1 to 7.8

#### Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3 to 5 dry; 2 to 4 moist

Chroma: 2 to 4

Texture: Silty clay loam, silty clay, or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 5 percent pebbles

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 6.1 to 8.4

#### Bk horizons

Hue: 7.5YR, 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Silt loam, silty clay loam, silty clay, or clay

Clay content: 30 to 45 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.4 to 8.4

## 33A—Savage silty clay loam, 0 to 2 percent slopes

### Setting

*Landform:* Alluvial fans

*Slope:* 0 to 2 percent

*Mean annual precipitation:* 15 to 19 inches

### Composition

#### Major Components

Savage and similar soils: 85 percent

#### Minor Components

Regent and similar soils: 0 to 3 percent

Farnuf and similar soils: 0 to 3 percent

Grail and similar soils: 0 to 3 percent

Daglun and similar soils: 0 to 3 percent

Adger and similar soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Silty clay loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 33C—Savage silty clay loam, 2 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 15 to 19 inches

#### Composition

##### Major Components

Savage and similar soils: 85 percent

##### Minor Components

Regent and similar soils: 0 to 3 percent

Farnuf and similar soils: 0 to 3 percent

Grail and similar soils: 0 to 3 percent

Daglun and similar soils: 0 to 3 percent

Adger and similar soils: 0 to 3 percent

#### Major Component Description

*Surface layer texture:* Silty clay loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

#### Shambo Series

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Permeability:* Moderate (0.6 to 2.0 inches/hour)

*Landform:* Alluvial fans

*Parent material:* Alluvium

*Slope range:* 2 to 8 percent

*Annual precipitation:* 15 to 19 inches

**Taxonomic Class:** Fine-loamy, mixed Typic  
Haploborolls

#### Typical Pedon

Shambo loam, 2 to 8 percent slopes, in an area of rangeland, 500 feet south and 500 feet east of the northwest corner of sec. 17, T. 10 N., R. 60 E.

A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and few fine roots; many very fine pores; neutral; clear smooth boundary.

Bw—5 to 14 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; many very fine roots; many very fine pores; moderately alkaline; gradual wavy boundary.

Bk1—14 to 23 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; many very fine roots; many very fine pores; disseminated lime; common fine masses of lime; strongly effervescent; moderately alkaline; gradual irregular boundary.

Bk2—23 to 36 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; massive; hard, friable, slightly sticky, slightly plastic; common very fine roots; many very fine pores; many fine masses of lime; strongly effervescent; strongly alkaline; gradual irregular boundary.

C—36 to 60 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, slightly sticky, slightly plastic; few very fine roots; common very fine pores; disseminated lime; strongly effervescent; moderately alkaline.

#### Range in Characteristics

*Thickness of the mollic epipedon:* 7 to 16 inches

*Depth to the Bk horizon:* 14 to 20 inches

##### A horizon

Hue: 10YR

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 10 to 27 percent

Reaction: pH 6.6 to 7.3

##### Bw horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 to 4

Texture: Loam, silt loam, or clay loam

Clay content: 18 to 35 percent

Reaction: pH 6.6 to 8.4

##### Bk horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Clay content: 18 to 35 percent  
 Calcium carbonate equivalent: 5 to 15 percent  
 Reaction: pH 7.4 to 9.0

*C horizon*

Hue: 10YR, 2.5Y, or 5Y  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Clay content: 18 to 20 percent  
 Reaction: pH 7.4 to 9.0

**31C—Shambo loam, 2 to 8 percent slopes**

**Setting**

*Landform:* Alluvial fans  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 15 to 19 inches

**Composition**

**Major Components**

Shambo and similar soils: 85 percent

**Minor Components**

Farnuf and similar soils: 0 to 5 percent  
 Daglum and similar soils: 0 to 4 percent  
 Cambert and similar soils: 0 to 3 percent  
 Dast and similar soils: 0 to 3 percent

**Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 10.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Tanna Series**

*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Permeability:* Slow (0.06 to 0.2 inch/hour)  
*Landform:* Sedimentary plains and hills  
*Parent material:* Residuum from semiconsolidated shale

*Slope range:* 2 to 15 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine, montmorillonitic Aridic Argiborolls

**Typical Pedon**

Tanna silty clay loam, 2 to 8 percent slopes, in an area of rangeland, 1,200 feet north and 1,600 feet west of the southeast corner of sec. 14, T. 7 N., R. 58 E.

A—0 to 4 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; many fine roots; many fine tubular pores; neutral; clear smooth boundary.

Bt—4 to 13 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; strong medium prismatic structure parting to strong medium subangular blocky; hard, firm, moderately sticky, moderately plastic; many fine roots; many fine tubular pores; many distinct clay films on faces of peds and in pores; neutral; clear smooth boundary.

Btk—13 to 18 inches; light brownish gray (10YR 6/2) clay, grayish brown (10YR 5/2) moist; moderate coarse prismatic structure parting to strong coarse subangular blocky; hard, firm, very sticky, very plastic; many fine roots; many fine tubular pores; few faint clay films on faces of peds; common medium masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk1—18 to 25 inches; light brownish gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) moist; moderate coarse prismatic structure; hard, friable, very sticky, very plastic; common fine roots; common fine tubular pores; many medium masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—25 to 32 inches; light brownish gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure; hard, friable, very sticky, very plastic; common fine roots; common fine tubular pores; 10 percent shale fragments; many medium masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Cr—32 to 60 inches; light brownish gray (10YR 6/2) semiconsolidated shale that crushes to clay loam, dark grayish brown (10YR 4/2) moist.

### Range in Characteristics

*Soil temperature:* 40 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches; dry in some part six-tenths or more of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher.

*Depth to the Bk horizon:* 10 to 20 inches

*Depth to the Cr horizon:* 20 to 40 inches

*Other features:* Some pedons do not have a Btk horizon.

#### A horizon

Hue: 10YR or 2.5Y

Value: 2 or 3 moist

Chroma: 2 or 3

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent channers

Reaction: pH 6.6 to 7.8

#### Bt horizon

Hue: 10YR or 2.5Y

Value: 3 or 4 moist

Chroma: 2 or 3

Texture: Clay loam, silty clay loam, clay, or silty clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent channers

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 6.6 to 8.4

#### Btk horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Clay content: 40 to 50 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

#### Bk horizons

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Clay loam, silty clay loam, or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent channers

Electrical conductivity: 2 to 4 mmhos/cm

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

#### Cr horizon

Material: Semiconsolidated shale with thin layers of hard sandstone that are rippable.

### 64C—Tanna silty clay loam, 2 to 8 percent slopes

#### Setting

*Landform:* Sedimentary plains

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Tanna and similar soils: 85 percent

##### Minor Components

Weingart and similar soils: 0 to 4 percent

Marmarth and similar soils: 0 to 3 percent

Yawdim and similar soils: 0 to 3 percent

Ethridge and similar soils: 0 to 3 percent

Tanna and similar soils, slopes more than 8 percent:  
0 to 2 percent

#### Major Component Description

*Surface layer texture:* Silty clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 164C—Tanna-Ethridge silty clay loams, 2 to 8 percent slopes

#### Setting

*Landform:*

- Tanna—Sedimentary plains

- Ethridge—Sedimentary plains

*Slope:*

- Tanna—2 to 8 percent

- Ethridge—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

## Composition

### Major Components

Tanna and similar soils: 50 percent  
Ethridge and similar soils: 35 percent

### Minor Components

Yawdim and similar soils: 0 to 4 percent  
Soils with clay loam surface layers: 0 to 3 percent  
Soils with sandy loam surface layers: 0 to 3 percent  
Moderately saline soils: 0 to 3 percent  
Soils with slopes less than 2 percent: 0 to 2 percent

### Major Component Description

#### Tanna

*Surface layer texture:* Silty clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 5.4 inches

#### Ethridge

*Surface layer texture:* Silty clay loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 164D—Tanna-Ethridge silty clay loams, 8 to 15 percent slopes

#### Setting

##### *Landform:*

- Tanna—Hills
- Ethridge—Hills

##### *Slope:*

- Tanna—8 to 15 percent
- Ethridge—8 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

## Composition

### Major Components

Tanna and similar soils: 55 percent  
Ethridge and similar soils: 30 percent

### Minor Components

Soils with clay loam surface layers: 0 to 3 percent  
Yawdim and similar soils: 0 to 3 percent  
Moderately saline soils: 0 to 3 percent  
Soils with slopes more than 15 percent: 0 to 3 percent  
Soils with sandy loam surface layers: 0 to 3 percent

### Major Component Description

#### Tanna

*Surface layer texture:* Silty clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.8 inches

#### Ethridge

*Surface layer texture:* Silty clay loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### *Tricart Series*

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate to a depth of 9 inches (0.6 to 2.0 inches/hour); moderately rapid below (2.0 to 6.0 inches/hour)  
*Landform:* Relict stream terraces  
*Parent material:* Alluvium  
*Slope range:* 4 to 15 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Loamy-skeletal, mixed Aridic Calciborolls

### Typical Pedon

Tricart loam, 4 to 15 percent slopes, in an area of rangeland, 1,500 feet south and 1,500 feet east of the northwest corner of sec. 36, T. 5 N., R. 59 E.

A—0 to 5 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; common very fine pores; 5 percent pebbles; slightly alkaline; clear smooth boundary.

Bk1—5 to 9 inches; grayish brown (10YR 5/2) gravelly loam, dark grayish brown (10YR 4/2) moist; weak medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; 20 percent pebbles; disseminated lime; many faint lime coatings on pebbles; strongly effervescent; moderately alkaline; clear wavy boundary.

2Bk2—9 to 26 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; weak medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; 40 percent pebbles; common distinct lime coatings on pebbles; many fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

2Bk3—26 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine roots; 50 percent pebbles; common distinct lime coatings on pebbles; many fine masses of lime; violently effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Other features:* In cultivated areas, strong to violent effervescence may result from mixing the A and Bk horizons.

#### A horizon

Hue: 10YR or 2.5Y

Chroma: 2 or 3

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

#### Bk1 horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 or 3

Texture: Sandy loam, loam, or clay loam

Clay content: 15 to 25 percent

Content of rock fragments: 10 to 35 percent pebbles

Calcium carbonate equivalent: 10 to 30 percent

Reaction: pH 7.4 to 8.4

#### 2Bk horizons

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 or 3

Texture: Loam or sandy loam

Clay content: 5 to 15 percent

Content of rock fragments: 35 to 60 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

## 23D—Tricart loam, 4 to 15 percent slopes

### Setting

*Landform:* Relict stream terraces

*Slope:* 4 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Tricart and similar soils: 85 percent

#### Minor Components

Soils with gravelly loam surface layers: 0 to 3 percent

Soils with slopes more than 15 percent: 0 to 3 percent

Soils with less rock fragments: 0 to 3 percent

Soils with lighter colored surface layers: 0 to 3 percent

Moderately deep soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

## Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Twilight Series

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Moderately rapid (2.0 to 6.0 inches/hour)

*Landform:* Sedimentary plains and hills

*Parent material:* Semiconsolidated, sandy sedimentary beds

*Slope range:* 2 to 25 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Coarse-loamy, mixed, frigid Aridic Ustochrepts

### Typical Pedon

Twilight fine sandy loam, 2 to 8 percent slopes, in an area of rangeland, 300 feet north and 2,400 feet west of the southeast corner of sec. 19, T. 8 N., R. 60 E.

A—0 to 4 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; neutral; clear smooth boundary.

Bw—4 to 11 inches; yellowish brown (10YR 5/4) fine sandy loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to weak medium and fine subangular blocky; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; neutral; clear smooth boundary.

Bk1—11 to 15 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium and fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—15 to 27 inches; pale yellow (2.5Y 7/4) fine sandy loam, light olive brown (2.5Y 5/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine roots; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Cr—27 to 60 inches; pale yellow (2.5Y 7/4) semiconsolidated, sandy sedimentary beds that crush to fine sandy loam, light olive brown (2.5Y 5/4) moist.

## Range in Characteristics

*Depth to the Bk horizon:* 10 to 20 inches

*Depth to the Cr horizon:* 20 to 40 inches

### A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Reaction: pH 6.6 to 7.8

### Bw horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Reaction: pH 6.6 to 7.8

### Bk horizons

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 1 to 4

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

## 69C—Twilight fine sandy loam, 2 to 8 percent slopes

### Setting

*Landform:* Sedimentary plains

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Twilight and similar soils: 85 percent

#### Minor Components

Blacksheep and similar soils: 0 to 3 percent

Busby and similar soils: 0 to 3 percent

Delpoint and similar soils: 0 to 3 percent

Chinook and similar soils: 0 to 3 percent

Soils that are calcareous throughout: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Fine sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 69D—Twilight fine sandy loam, 8 to 15 percent slopes

### Setting

*Landform:* Hills

*Slope:* 8 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Twilight and similar soils: 85 percent

#### Minor Components

Blacksheep and similar soils: 0 to 3 percent

Busby and similar soils: 0 to 3 percent

Delpoint and similar soils: 0 to 3 percent

Soils with darker-colored surface layers: 0 to 3 percent

Soils that are calcareous throughout: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Fine sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 269C—Twilight-Bonfri complex, 2 to 8 percent slopes

### Setting

*Landform:*

- Twilight—Sedimentary plains

- Bonfri—Sedimentary plains

*Position on landform:*

- Twilight—Shoulders and summits

- Bonfri—Backslopes and shoulders

*Slope:*

- Twilight—2 to 8 percent

- Bonfri—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Twilight and similar soils: 55 percent

Bonfri and similar soils: 30 percent

#### Minor Components

Cabbart and similar soils: 0 to 3 percent

Busby and similar soils: 0 to 3 percent

Cambeth and similar soils: 0 to 3 percent

Weingart and similar soils: 0 to 3 percent

Soils that are calcareous throughout: 0 to 2 percent

Soils with darker-colored surface layers: 0 to 1 percent

### Major Component Description

#### Twilight

*Surface layer texture:* Fine sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.8 inches

#### Bonfri

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 269D—Twilight-Bonfri complex, 8 to 15 percent slopes

### Setting

#### *Landform:*

- Twilight—Hills
- Bonfri—Hills

#### *Position on landform:*

- Twilight—Shoulders and summits
- Bonfri—Backslopes and shoulders

#### *Slope:*

- Twilight—8 to 15 percent
- Bonfri—8 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Twilight and similar soils: 55 percent

Bonfri and similar soils: 30 percent

#### Minor Components

Cabbart and similar soils: 0 to 3 percent

Busby and similar soils: 0 to 3 percent

Cambeth and similar soils: 0 to 3 percent

Weingart and similar soils: 0 to 3 percent

Soils that are calcareous throughout: 0 to 2 percent

Soils with darker-colored surface layers: 0 to 1 percent

### Major Component Description

#### Twilight

*Surface layer texture:* Fine sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.8 inches

#### Bonfri

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Interbedded sandstone and shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 369C—Twilight-Delpoint complex, 2 to 8 percent slopes

### Setting

#### *Landform:*

- Twilight—Sedimentary plains
- Delpoint—Sedimentary plains

#### *Position on landform:*

- Twilight—Shoulders and summits
- Delpoint—Backslopes and shoulders

#### *Slope:*

- Twilight—2 to 8 percent
- Delpoint—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Twilight and similar soils: 50 percent

Delpoint and similar soils: 35 percent

#### Minor Components

Cabbart and similar soils: 0 to 4 percent

Yamacall and similar soils: 0 to 4 percent

Cambeth and similar soils: 0 to 3 percent

Soils that are calcareous throughout: 0 to 2 percent

Soils with darker-colored surface layers: 0 to 2 percent

### Major Component Description

#### Twilight

*Surface layer texture:* Sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.6 inches

**Delpoint**

*Surface layer texture:* Loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**369D—Twilight-Cabbart complex,  
8 to 15 percent slopes****Setting**

*Landform:*

- Twilight—Hills
- Cabbart—Hills

*Position on landform:*

- Twilight—Backslopes and shoulders
- Cabbart—Shoulders and summits

*Slope:*

- Twilight—8 to 15 percent
- Cabbart—8 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Twilight and similar soils: 50 percent

Cabbart and similar soils: 35 percent

**Minor Components**

Yamacall and similar soils: 0 to 3 percent

Very shallow loamy soils: 0 to 3 percent

Cambeth and similar soils: 0 to 3 percent

Slightly saline soils: 0 to 3 percent

Soils with darker-colored surface layers: 0 to 2 percent

Soils with slopes more than 15 percent: 0 to 1 percent

**Major Component Description****Twilight**

*Surface layer texture:* Sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.7 inches

**Cabbart**

*Surface layer texture:* Loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**Varney Series**

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Permeability:* Moderate (0.6 to 2.0 inches/hour)

*Landform:* Alluvial fans and stream terraces

*Parent material:* Alluvium

*Slope range:* 0 to 8 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-loamy, mixed Aridic Argiborolls

**Typical Pedon**

Varney loam, 2 to 8 percent slopes, in an area of cropland, 2,500 feet north and 2,600 feet east of the southwest corner of sec. 22, T. 5 N., R. 59 E.

Ap—0 to 5 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and few fine roots; 5 percent pebbles; neutral; clear smooth boundary.

Bt—5 to 12 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; hard, very friable, moderately sticky, moderately

plastic; many very fine and few fine roots; many very fine tubular pores; common faint clay films on faces of peds; 5 percent pebbles; neutral; clear wavy boundary.

**Bk1**—12 to 17 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; moderate medium and fine subangular blocky structure; hard, very friable, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; 10 percent pebbles; many fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

**Bk2**—17 to 25 inches; light yellowish brown (2.5Y 6/3) gravelly sandy loam, light olive brown (2.5Y 5/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine roots; 25 percent pebbles; disseminated lime; violently effervescent; moderately alkaline; gradual wavy boundary.

**BC**—25 to 60 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky, nonplastic; common very fine roots; 30 percent pebbles; disseminated lime; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Soil temperature:* 40 to 47 degrees F

*Moisture control section:* Between 4 to 12 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at 20 inches is 41 degrees F or higher.

*Thickness of the mollic epipedon:* 7 to 16 inches

*Depth to the Bk horizon:* 11 to 20 inches

#### *Ap horizon*

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent pebbles

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 6.6 to 7.3

#### *Bt horizon*

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture: Clay loam or sandy clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 5 to 15 percent pebbles

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 6.6 to 7.8

#### *Bk1 horizon*

Hue: 10YR or 2.5Y

Value: 5 to 8 dry; 4 to 7 moist

Chroma: 2 to 4

Texture: Sandy loam, loam, clay loam, or sandy clay loam

Clay content: 10 to 30 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent cobbles; 5 to 30 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 7.4 to 8.4

#### *Bk2 horizon*

Hue: 10YR or 2.5Y

Value: 6 to 8 dry; 4 to 7 moist

Chroma: 3 or 4

Texture: Sandy loam, loam, or sandy clay loam

Clay content: 10 to 30 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent cobbles; 5 to 30 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 7.4 to 8.4

#### *BC horizon*

Hue: 2.5Y, 10YR, or 7.5YR

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Clay content: 10 to 15 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent cobbles; 5 to 30 percent pebbles

Electrical conductivity: 0 to 2 mmhos/cm

Calcium carbonate equivalent: 15 to 25 percent

Reaction: pH 7.9 to 8.4

## 22A—Varney loam, 0 to 2 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 0 to 2 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Varney and similar soils: 85 percent

#### Minor Components

Moderately saline soils: 0 to 3 percent

Soils with very gravelly substratum: 0 to 3 percent

Moderately deep loamy soils: 0 to 3 percent

Very deep clayey soils: 0 to 3 percent  
 Soils with lighter colored surface layers: 0 to 2 percent  
 Lonna and similar soils: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 22C—Varney loam, 2 to 8 percent slopes

### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Varney and similar soils: 85 percent

#### Minor Components

Soils with very gravelly substratums: 0 to 3 percent  
 Soils that are calcareous throughout: 0 to 3 percent  
 Soils with lighter colored surface layers: 0 to 3 percent  
 Moderately deep loamy soils: 0 to 3 percent  
 Moderately saline soils: 0 to 2 percent  
 Soils with nongravelly substratums: 0 to 1 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 122C—Varney-Gerdrum complex, 2 to 8 percent slopes

### Setting

*Landform:*

- Varney—Alluvial fans and stream terraces
- Gerdrum—Alluvial fans and stream terraces

*Position on landform:*

- Varney—Backslopes and footslopes
- Gerdrum—Footslopes and toeslopes

*Slope:*

- Varney—2 to 8 percent
- Gerdrum—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Varney and similar soils: 50 percent  
 Gerdrum and similar soils: 35 percent

#### Minor Components

Yamacall and similar soils: 0 to 3 percent  
 Delpoint and similar soils: 0 to 3 percent  
 Soils with gravelly surface layers: 0 to 3 percent  
 Soils with very gravelly substratums: 0 to 3 percent  
 Soils that are calcareous throughout: 0 to 2 percent  
 Areas barren of vegetation: 0 to 1 percent

### Major Component Description

#### Varney

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.6 inches

#### Gerdrum

*Surface layer texture:* Clay loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 5.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Vebar Series

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Moderately rapid (2.0 to 6.0 inches/hour)

*Landform:* Sedimentary plains and hills

*Parent material:* Semiconsolidated sandstone

*Slope range:* 2 to 15 percent

*Annual precipitation:* 15 to 19 inches

**Taxonomic Class:** Coarse-loamy, mixed Typic Haploborolls

### Typical Pedon

Vebar fine sandy loam, in an area of Vebar-Cohagen fine sandy loams, 4 to 15 percent slopes, in an area of cropland, 2,500 feet south and 1,500 feet west of the northeast corner of sec. 9, T. 10 N., R. 61 E.

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium and fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and common fine roots; slightly alkaline; gradual wavy boundary.

Bw1—4 to 10 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse and medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky, nonplastic; many very fine roots; common very fine pores; neutral; gradual wavy boundary.

Bw2—10 to 15 inches; brown (10YR 5/3) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure parting to weak fine subangular blocky; slightly hard, very friable, nonsticky, nonplastic; many very fine roots; common very fine pores; disseminated lime; slightly effervescent; moderately alkaline; gradual wavy boundary.

Bk—15 to 25 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common very fine roots; common very fine pores; many fine masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cr—25 to 60 inches; pale brown (10YR 6/3) semiconsolidated sandstone that crushes to a loamy sand (10YR 5/3) moist.

### Range in Characteristics

*Thickness of the mollic epipedon:* 7 to 16 inches

*Depth to the Bk horizon:* 11 to 25 inches

*Depth to the Cr horizon:* 20 to 40 inches

#### Ap horizon

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 10 to 18 percent

Reaction: pH 6.1 to 7.8

#### Bw horizons

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 to 4

Texture: Fine sandy loam or sandy loam

Clay content: 10 to 18 percent

Reaction: pH 6.1 to 8.4

#### Bk horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Fine sandy loam, sandy loam, or loamy fine sand

Clay content: 7 to 15 percent

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

### 40C—Vebar fine sandy loam, 2 to 8 percent slopes

#### Setting

*Landform:* Sedimentary plains

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 15 to 19 inches

#### Composition

##### Major Components

Vebar and similar soils: 85 percent

##### Minor Components

Soils with slopes more than 8 percent: 0 to 4 percent

Soils that are calcareous throughout: 0 to 3 percent

Soils with darker-colored surface layers: 0 to 3 percent

Shallow loamy soils: 0 to 3 percent

Deep loamy soils: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Fine sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 140D—Vebar-Cohagen fine sandy loams, 4 to 15 percent slopes

### Setting

*Landform:*

- Vebar—Sedimentary plains and hills
- Cohagen—Sedimentary plains and hills

*Position on landform:*

- Vebar—Backslopes and shoulders
- Cohagen—Shoulders and summits

*Slope:*

- Vebar—4 to 15 percent
- Cohagen—4 to 15 percent

*Mean annual precipitation:* 15 to 19 inches

### Composition

#### Major Components

Vebar and similar soils: 65 percent

Cohagen and similar soils: 20 percent

#### Minor Components

Very shallow loamy soils: 0 to 4 percent

Very deep loamy soils: 0 to 3 percent

Soils with darker-colored surface layers: 0 to 3 percent

Soils with slopes more than 15 percent: 0 to 3 percent

Soils with slopes less than 4 percent: 0 to 2 percent

### Major Component Description

#### Vebar

*Surface layer texture:* Fine sandy loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.9 inches

#### Cohagen

*Surface layer texture:* Fine sandy loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Sandstone residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Wabek Series

*Depth class:* Very deep (>60 inches)

*Drainage class:* Excessively drained

*Permeability:* Rapid (6.0 to 20.0 inches/hour)

*Landform:* Relict stream terraces

*Parent material:* Very gravelly or extremely gravelly alluvium

*Slope range:* 8 to 35 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Sandy-skeletal, mixed Entic Haploborolls

### Typical Pedon

Wabek sandy loam, 8 to 25 percent slopes, in an area of rangeland, 1,500 feet north and 100 feet east of the southwest corner of sec. 1, T. 8 N., R. 55 E.

A—0 to 8 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium and fine subangular blocky; soft, friable, slightly sticky, slightly plastic; many very fine and fine roots; neutral; clear smooth boundary.

2Bk—8 to 15 inches; very pale brown (10YR 7/3) gravelly sandy loam, brown (10YR 5/3) moist; single grain; loose, nonsticky, nonplastic; common very fine roots; 30 percent pebbles; disseminated lime; continuous faint lime coatings on underside of pebbles; violently effervescent; strongly alkaline; clear wavy boundary.

2C1—15 to 27 inches; pale brown (10YR 6/3) very gravelly loamy sand, dark brown (10YR 4/3) moist; single grain; loose, nonsticky, nonplastic; common very fine roots; 50 percent pebbles; disseminated lime; strongly effervescent; slightly alkaline; gradual wavy boundary.

2C2—27 to 60 inches; pale brown (10YR 6/3) very gravelly loamy sand with strata of light gray (10YR 7/2) sand, brown (10YR 5/3) moist with strata of grayish brown (10YR 5/2) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; 40 percent pebbles; slightly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 7 to 10 inches

*Depth to the Bk horizon:* 5 to 10 inches

*Taxonomic features:* The Wabek series as mapped in Fallon County is a taxadjunct to the series and classifies as sandy-skeletal, mixed Torriorthentic Haploborolls. This is based on a 7-inch mixed surface that has a dry color value of 5 and a moisture control section that is dry more than six-tenths of the time. Use and management are similar.

*Other features:* The 2C horizon is stratified sand and gravel. Lime typically coats the undersides of rock fragments.

#### A horizon

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 10 to 20 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

#### 2Bk horizon

Hue: 10YR or 2.5Y

Value: 4 to 8 dry; 2 to 6 moist

Chroma: 2 to 4

Texture: Sandy loam or loamy sand

Clay content: 10 to 20 percent

Calcium carbonate equivalent: 5 to 15 percent

Content of rock fragments: 15 to 50 percent pebbles

Reaction: pH 7.4 to 9.0

#### 2C horizons

Hue: 10YR or 2.5Y

Value: 4 to 7 dry; 3 to 6 moist

Chroma: 2 to 4

Clay content: 0 to 3 percent

Content of rock fragments: 35 to 75 percent pebbles

Reaction: pH 7.4 to 9.0

## 73E—Wabek sandy loam, 8 to 25 percent slopes

### Setting

*Landform:* Relict stream terraces

*Slope:* 8 to 25 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Wabek and similar soils: 85 percent

#### Minor Components

Soils that are nongravelly throughout: 0 to 3 percent

Twilight and similar soils: 0 to 3 percent

Blacksheep and similar soils: 0 to 3 percent

Soils that are calcareous throughout: 0 to 2 percent

Soils with stones and cobbles: 0 to 2 percent

Kremlin and similar soils: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Sandy loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Excessively drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 173E—Wabek gravelly sandy loam, 8 to 35 percent slopes

### Setting

*Landform:* Relict stream terraces

*Slope:* 8 to 35 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Wabek and similar soils: 85 percent

#### Minor Components

Cabbart and similar soils: 0 to 4 percent

Kremlin and similar soils: 0 to 4 percent

Soils that are calcareous throughout: 0 to 3 percent

Soils with stones and cobbles: 0 to 2 percent

Nongravelly soils: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Gravelly sandy loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Excessively drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## W—Water

### Composition

#### Major Components

Water: 100 percent

### Major Component Description

*Definition:* Areas of open water

## Wayden Series

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Permeability:* Slow (0.06 to 0.2 inch/hour)

*Landform:* Sedimentary plains and hills

*Parent material:* Semiconsolidated shale

*Slope range:* 4 to 45 percent

*Annual precipitation:* 15 to 19 inches

**Taxonomic Class:** Clayey, montmorillonitic (calcareous), frigid, shallow Typic Ustorthents

### Typical Pedon

Wayden silty clay, in an area of Wayden-Barkof complex, 4 to 15 percent slopes, in an area of rangeland, 1,200 feet south and 1,300 feet west of the northeast corner of sec. 35, T. 10 N., R. 60 E.

A—0 to 2 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium and fine granular structure; hard, friable, very sticky, very plastic; common very fine roots; neutral; clear smooth boundary.

C1—2 to 8 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate coarse and medium subangular blocky structure; extremely hard, very firm, very sticky, very plastic; common very fine roots; slightly alkaline; gradual wavy boundary.

C2—8 to 18 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; massive; extremely hard, very firm, very sticky, very plastic; few very fine roots; few soft shale chips; strong effervescence; moderately alkaline; gradual wavy boundary.

Cr—18 to 60 inches; light brownish gray (2.5Y 6/2) with yellowish brown (10YR 5/4) stains on plates in places, semiconsolidated shale that crushes to silty clay, grayish brown (2.5Y 5/2) moist.

### Range in Characteristics

*Depth to the Cr horizon:* 10 to 20 inches

#### A horizon

Hue: 2.5Y or 5Y

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 2 or 3

Clay content: 27 to 50 percent

Content of rock fragments: 0 to 20 percent stones

Reaction: pH 6.6 to 9.0

#### C horizons

Hue: 2.5Y or 5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 1 to 4

Texture: Silty clay, silty clay loam, clay, or clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 20 percent stones

Reaction: pH 7.4 to 9.0

## 218D—Wayden-Barkof complex, 4 to 15 percent slopes

### Setting

#### *Landform:*

- Wayden—Sedimentary plains and hills
- Barkof—Sedimentary plains and hills

#### *Position on landform:*

- Wayden—Shoulders and summits
- Barkof—Backslopes and shoulders

#### *Slope:*

- Wayden—4 to 15 percent
- Barkof—4 to 15 percent

*Mean annual precipitation:* 15 to 19 inches

### Composition

#### Major Components

Wayden and similar soils: 50 percent

Barkof and similar soils: 35 percent

#### Minor Components

Very shallow clayey soils: 0 to 4 percent

Very deep clayey soils: 0 to 3 percent

Very deep loamy soils: 0 to 3 percent

Soils with stony surface layers: 0 to 2 percent

Soils with slopes more than 15 percent: 0 to 2 percent

Soils that are calcareous throughout: 0 to 1 percent

### Major Component Description

#### Wayden

*Surface layer texture:* Silty clay

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 3.0 inches

#### Barkof

*Surface layer texture:* Clay

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Weingart Series

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Very slow (<0.06 inch/hour)

*Landform:* Sedimentary plains and hills

*Parent material:* Semiconsolidated shale

*Slope range:* 2 to 15 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine, montmorillonitic Typic Natriboralfs

### Typical Pedon

Weingart clay loam, 2 to 8 percent slopes, in an area of rangeland, 2,600 feet south and 2,000 feet west of the northeast corner of sec. 16, T. 8 N., R. 57 E.

E—0 to 2 inches; light brownish gray (2.5Y 6/2) loam, very dark grayish brown (2.5Y 3/2) moist; weak very fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine roots; slightly alkaline; abrupt smooth boundary.

Btn—2 to 10 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong medium columnar structure parting to strong medium and fine subangular blocky; very hard, very firm, very sticky, very plastic; many very fine roots; many very fine tubular pores; continuous faint clay films on faces of peds and in pores; moderately alkaline; gradual wavy boundary.

Bkn—10 to 17 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong medium and fine subangular blocky structure; extremely hard, very firm, very sticky, very plastic; common very fine roots; common very fine tubular pores; disseminated lime; few fine masses of lime; strongly effervescent; strongly alkaline; gradual wavy boundary.

Bnyz—17 to 25 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; extremely hard, very firm, very sticky, very plastic; few very fine roots; many medium and fine masses of gypsum crystals and other salts; moderately alkaline; gradual wavy boundary.

Cr—25 to 60 inches; light brownish gray (2.5Y 6/2) semiconsolidated shale, grayish brown (2.5Y 5/2) moist.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature is 41 degrees F or above.

*Depth to the Bkn horizon:* 8 to 16 inches

*Depth to the Bnyz horizon:* 16 to 22 inches

*Depth to the Cr horizon:* 20 to 40 inches

*Other features:* Pedons with sodium adsorption ratios of less than 13 have more exchangeable magnesium plus sodium than calcium plus exchange acidity.

#### *E horizon*

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 3 to 6 moist

Chroma: 2 or 3

Texture: Clay loam mixed to 7 inches (uncultivated areas have a thin A horizon that is a loam or silt loam)

Clay content: 27 to 40 percent

Reaction: pH 5.6 to 7.8

#### *Btn horizon*

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Clay, silty clay, or sandy clay

Clay content: 40 to 60 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent hard shale; 0 to 5 percent soft shale

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 10 to 30

Reaction: pH 6.5 to 9.0

#### *Bkn horizon*

Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Clay loam, silty clay, clay, sandy clay, or silty clay loam

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent hard shale; 0 to 5 percent soft shale

Electrical conductivity: 4 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 30

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.8 to 9.0

#### *Bnyz horizon*

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 1 to 4

Texture: Clay, silty clay, clay loam, or silty clay loam

Clay content: 35 to 55 percent

Content of rock fragments: 60 to 75 percent—5 to 30 percent hard shale; 45 to 55 percent soft shale

Electrical conductivity: 4 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 30

Gypsum: 1 to 5 percent

Reaction: pH 7.8 to 9.0

#### *Cr horizon*

Material: Semiconsolidated shale or interbedded shale and sandstone

## 15C—Weingart clay loam, 2 to 8 percent slopes

### Setting

*Landform:* Sedimentary plains

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Weingart and similar soils: 85 percent

#### Minor Components

Nonsaline and nonsodic soils: 0 to 3 percent

Soils with slopes less than 2 percent: 0 to 3 percent

Soils with slopes more than 8 percent: 0 to 3 percent

Areas barren of vegetation: 0 to 3 percent

Gerdrum and similar soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Clay loam

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Salt affected:* Saline within 30 inches

*Sodium affected:* Sodic within 30 inches

*Available water capacity:* Mainly 3.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**Winifred Series**

*Depth class:* Moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Permeability:* Slow (0.06 to 0.2 inch/hour)

*Landform:* Sedimentary plains and hills

*Parent material:* Semiconsolidated shale

*Slope range:* 4 to 15 percent

*Annual precipitation:* 15 to 19 inches

**Taxonomic Class:** Fine, montmorillonitic Typic  
Haploborolls

**Typical Pedon**

Winifred silty clay loam, 4 to 15 percent slopes, in an area of rangeland, 2,600 feet north and 500 feet east of the southwest corner of sec. 22, T. 9 N., R. 60 E.

A—0 to 4 inches; dark grayish brown (2.5Y 4/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; weak coarse subangular blocky structure parting to moderate fine granular; hard, firm, moderately sticky, moderately plastic; many fine roots; slightly alkaline; clear smooth boundary.

Bw1—4 to 9 inches; grayish brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; strong medium subangular blocky structure; very hard, firm, moderately sticky, very plastic; many very fine and fine roots; few very fine pores; moderately alkaline; clear wavy boundary.

Bw2—9 to 15 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; very hard, firm, very sticky, very plastic; common very fine and fine roots; few very fine pores; disseminated lime; slightly effervescent; moderately alkaline; clear wavy boundary.

Bk1—15 to 23 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; extremely hard, very firm, very sticky, very plastic; common very fine and fine roots; few very fine pores; many large irregularly shaped masses of lime; strongly effervescent; strongly alkaline; gradual wavy boundary.

Bk2—23 to 31 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; extremely hard, very firm, very sticky, very plastic; few very fine roots; few fine masses of lime; slightly effervescent; moderately alkaline; clear wavy boundary.

Cr—31 to 60 inches; light gray (2.5Y 6/0) semiconsolidated shale that crushes to silty clay, gray (2.5Y 5/0) moist.

**Range in Characteristics**

*Soil temperature:* 42 to 47 degrees F

*Moisture control section:* Between 4 and 12 inches

*Thickness of the mollic epipedon:* 7 to 10 inches

*Depth to the Bk horizon:* 12 to 18 inches

*Depth to the Cr horizon:* 20 to 40 inches

**A horizon**

Hue: 10YR or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 27 to 40 percent

Reaction: pH 6.6 to 7.8

**Bw horizons**

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Clay loam, silty clay, clay, or silty clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 10 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 7.4 to 8.4

**Bk horizons**

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 or 3

Texture: Clay, silty clay, silty clay loam, or clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 10 percent cobbles; 0 to 5 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

**128D—Winifred silty clay loam,  
4 to 15 percent slopes****Setting**

*Landform:* Sedimentary plains and hills

*Slope:* 4 to 15 percent

*Mean annual precipitation:* 15 to 19 inches

**Composition****Major Components**

Winifred and similar soils: 85 percent

**Minor Components**

Wayden and similar soils: 0 to 5 percent

Daglun and similar soils: 0 to 4 percent

Regent and similar soils: 0 to 3 percent

Cabba and similar soils: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Silty clay loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Yamacall Series

*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Permeability:* Moderate (0.6 to 2.0 inches/hour)  
*Landform:* Alluvial fans, stream terraces, sedimentary plains, and hills  
*Parent material:* Alluvium  
*Slope range:* 0 to 25 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Fine-loamy, mixed, frigid Aridic Ustochrepts

### Typical Pedon

Yamacall loam, 2 to 8 percent slopes, in an area of rangeland, 200 feet north and 2,350 feet east of the southwest corner of sec. 29, T. 10 N., R. 58 E.

- A—0 to 3 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate thin platy structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine roots; neutral; gradual wavy boundary.
- Bw—3 to 12 inches; pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; many very fine roots; slightly effervescent; neutral; gradual wavy boundary.
- Bk1—12 to 30 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common very fine roots; few

fine masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk2—30 to 60 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure; slightly hard, very friable, moderately sticky, slightly plastic; common very fine roots; common fine masses of lime; violently effervescent; strongly alkaline.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F  
*Moisture control section:* Between 4 and 12 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher.  
*Depth to the Bk horizon:* 10 to 20 inches  
*Soil phases:* Calcareous  
*Other features:* When mixed to 7 inches, this horizon will not meet the requirements for a mollic epipedon.

#### A horizon

Hue: 10YR, 2.5Y, or 5Y  
 Value: 5 or 6 dry; 3 to 5 moist  
 Chroma: 2 to 4  
 Clay content: 16 to 27 percent  
 Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles  
 Calcium carbonate equivalent: 0 to 10 percent  
 Effervescence: None to strongly  
 Reaction: pH 6.6 to 8.4

#### Bw horizon

Hue: 10YR, 2.5Y, or 5Y  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Texture: Loam, clay loam, or silt loam  
 Clay content: 18 to 30 percent with 15 to 35 percent fine sand and coarser  
 Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles  
 Calcium carbonate equivalent: 0 to 15 percent  
 Effervescence: None to strongly  
 Reaction: pH 6.6 to 8.4

#### Bk horizons

Hue: 10YR, 2.5Y, or 5Y  
 Value: 5 to 8 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Texture: Loam, clay loam, or silt loam  
 Clay content: 10 to 30 percent with 15 to 35 percent fine sand and coarser  
 Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles  
 Electrical conductivity: 0 to 4 mmhos/cm

Calcium carbonate equivalent: 5 to 15 percent  
 Effervescence: Strongly or violently  
 Reaction: pH 7.9 to 9.0

### **86A—Yamacall loam, 0 to 2 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 0 to 2 percent  
*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Yamacall and similar soils: 85 percent

##### **Minor Components**

Soils that are calcareous throughout: 0 to 4 percent  
 Alona and similar soils: 0 to 3 percent  
 Soils with darker-colored surface layers: 0 to 3 percent  
 Busby and similar soils: 0 to 3 percent  
 Lonna and similar soils: 0 to 2 percent

#### **Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **86C—Yamacall loam, 2 to 8 percent slopes**

#### **Setting**

*Landform:* Alluvial fans and stream terraces  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Yamacall and similar soils: 90 percent

##### **Minor Components**

Soils that are calcareous throughout: 0 to 2 percent  
 Delpoint and similar soils: 0 to 2 percent  
 Busby and similar soils: 0 to 2 percent  
 Alona and similar soils: 0 to 2 percent  
 Soils with gravelly surface layers: 0 to 1 percent  
 Soils with darker-colored surface layers: 0 to 1 percent

#### **Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

### **86D—Yamacall loam, 8 to 15 percent slopes**

#### **Setting**

*Landform:* Alluvial fans  
*Slope:* 8 to 15 percent  
*Mean annual precipitation:* 10 to 14 inches

#### **Composition**

##### **Major Components**

Yamacall and similar soils: 90 percent

##### **Minor Components**

Alona and similar soils: 0 to 2 percent  
 Soils with darker-colored surface layers: 0 to 2 percent  
 Soils with slopes more than 15 percent: 0 to 2 percent  
 Soils with slopes less than 8 percent: 0 to 2 percent  
 Delpoint and similar soils: 0 to 2 percent

#### **Major Component Description**

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 186A—Yamacall-Havre loams, 0 to 2 percent slopes

### Setting

*Landform:*

- Yamacall—Stream terraces
- Havre—Flood plains

*Slope:*

- Yamacall—0 to 2 percent
- Havre—0 to 2 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Yamacall and similar soils: 70 percent

Havre and similar soils: 20 percent

#### Minor Components

Delpoint and similar soils: 0 to 2 percent

Lonna and similar soils: 0 to 2 percent

Soils with slopes more than 2 percent: 0 to 2 percent

Soils with darker-colored surface layers: 0 to 2 percent

Moderately saline soils: 0 to 1 percent

Poorly drained and ponded soils: 0 to 1 percent

### Major Component Description

#### Yamacall

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.7 inches

#### Havre

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* Rare

*Available water capacity:* Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 186C—Yamacall-Havre loams, 2 to 8 percent slopes

### Setting

*Landform:*

- Yamacall—Stream terraces
- Havre—Flood plains

*Slope:*

- Yamacall—2 to 8 percent
- Havre—2 to 4 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Yamacall and similar soils: 70 percent

Havre and similar soils: 20 percent

#### Minor Components

Delpoint and similar soils: 0 to 2 percent

Lonna and similar soils: 0 to 2 percent

Moderately saline soils: 0 to 2 percent

Areas of channels with steep slopes: 0 to 2 percent

Soils with darker-colored surface layers: 0 to 1 percent

Poorly drained and ponded soils: 0 to 1 percent

### Major Component Description

#### Yamacall

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.7 inches

**Havre**

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* Rare  
*Available water capacity:* Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**286C—Yamacall-Delpoint loams,  
2 to 8 percent slopes****Setting**

*Landform:*

- Yamacall—Sedimentary plains
- Delpoint—Sedimentary plains

*Position on landform:*

- Yamacall—Backslopes and footslopes
- Delpoint—Shoulders and summits

*Slope:*

- Yamacall—2 to 8 percent
- Delpoint—2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Yamacall and similar soils: 50 percent  
 Delpoint and similar soils: 35 percent

**Minor Components**

Cabbart and similar soils: 0 to 3 percent  
 Soils that are calcareous throughout: 0 to 3 percent  
 Moderately saline soils: 0 to 3 percent  
 Soils with slopes more than 8 percent: 0 to 3 percent  
 Soils with darker-colored surface layers: 0 to 3 percent

**Major Component Description****Yamacall**

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.7 inches

**Delpoint**

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

**Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

**386E—Yamacall-Cabbart loams,  
15 to 35 percent slopes****Setting**

*Landform:*

- Yamacall—Hills
- Cabbart—Hills

*Position on landform:*

- Yamacall—Backslopes and footslopes
- Cabbart—Shoulders and summits

*Slope:*

- Yamacall—15 to 25 percent
- Cabbart—15 to 35 percent

*Mean annual precipitation:* 10 to 14 inches

**Composition****Major Components**

Yamacall and similar soils: 50 percent  
 Cabbart and similar soils: 35 percent

**Minor Components**

Delpoint and similar soils: 0 to 3 percent  
 Areas of rock outcrop: 0 to 3 percent  
 Moderately saline soils: 0 to 3 percent  
 Soils with stony surface layers: 0 to 3 percent  
 Soils with slopes more than 35 percent: 0 to 2 percent  
 Poorly drained soils: 0 to 1 percent

**Major Component Description****Yamacall**

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.7 inches

### **Cabbart**

*Surface layer texture:* Loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, loamy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## **486D—Yamacall-Busby-Blacksheep complex, 4 to 15 percent slopes**

### **Setting**

*Landform:*

- Yamacall—Sedimentary plains and hills
- Busby—Sedimentary plains and hills
- Blacksheep—Sedimentary plains and hills

*Position on landform:*

- Yamacall—Backslopes and footslopes
- Busby—Backslopes and shoulders
- Blacksheep—Summits

*Slope:*

- Yamacall—4 to 15 percent
- Busby—4 to 15 percent
- Blacksheep—4 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

### **Composition**

#### **Major Components**

Yamacall and similar soils: 35 percent

Busby and similar soils: 30 percent

Blacksheep and similar soils: 20 percent

#### **Minor Components**

Delpoint and similar soils: 0 to 4 percent

Very shallow loamy soils: 0 to 3 percent

Areas of rock outcrop: 0 to 3 percent

Soils with darker-colored surface layers: 0 to 3 percent

Soils with slopes more than 15 percent: 0 to 2 percent

## **Major Component Description**

### **Yamacall**

*Surface layer texture:* Loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 9.7 inches

### **Busby**

*Surface layer texture:* Fine sandy loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 8.2 inches

### **Blacksheep**

*Surface layer texture:* Fine sandy loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### **Management**

For management information about this map unit, see appropriate sections in Part II of this publication.

## **586C—Yamacall loam, calcareous, 2 to 8 percent**

### **Setting**

*Landform:* Alluvial fans

*Slope:* 2 to 8 percent

*Mean annual precipitation:* 10 to 14 inches

### **Composition**

#### **Major Components**

Yamacall and similar soils: 85 percent

#### **Minor Components**

Delpoint and similar soils: 0 to 3 percent

Busby and similar soils: 0 to 3 percent

Moderately saline soils: 0 to 3 percent

Cambeth and similar soils: 0 to 3 percent  
Soils with darker-colored surface layers: 0 to 3 percent

### Major Component Description

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

## 586D—Yamacall-Delpoint-Cabbart loams, 8 to 15 percent slopes

### Setting

#### *Landform:*

- Yamacall—Hills
- Delpoint—Hills
- Cabbart—Hills

#### *Position on landform:*

- Yamacall—Footslopes
- Delpoint—Backslopes
- Cabbart—Shoulders and summits

#### *Slope:*

- Yamacall—8 to 15 percent
- Delpoint—8 to 15 percent
- Cabbart—8 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Yamacall and similar soils: 40 percent  
Delpoint and similar soils: 30 percent  
Cabbart and similar soils: 15 percent

#### Minor Components

Very shallow loamy soils: 0 to 4 percent  
Soils with calcareous surface layers: 0 to 3 percent  
Soils with slopes less than 8 percent: 0 to 3 percent  
Moderately saline soils: 0 to 3 percent  
Soils with darker-colored surface layers: 0 to 2 percent

### Major Component Description

#### Yamacall

*Surface layer texture:* Loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 9.7 inches

#### Delpoint

*Surface layer texture:* Loam  
*Depth class:* Moderately deep (20 to 40 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 4.5 inches

#### Cabbart

*Surface layer texture:* Loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, loamy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Yawdim Series

*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Permeability:* Slow (0.06 to 0.2 inch/hour)  
*Landform:* Sedimentary plains and hills  
*Parent material:* Semiconsolidated shale  
*Slope range:* 4 to 70 percent  
*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Clayey, montmorillonitic (calcareous), frigid, shallow Aridic Ustorthents

### Typical Pedon

Yawdim silty clay loam, 4 to 15 percent slopes, in an area of rangeland, 1,200 feet north and 400 feet west of the southeast corner of sec. 24, T. 8 N., R. 58 E.

- A—0 to 1 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine tubular pores; slightly effervescent; neutral; clear smooth boundary.
- C1—1 to 9 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky, slightly plastic; many very fine roots; many very fine tubular pores; slightly effervescent; slightly alkaline; clear smooth boundary.
- C2—9 to 15 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure; hard, friable, moderately sticky, moderately plastic; few very fine roots; common very fine tubular pores; slightly effervescent; slightly alkaline; clear smooth boundary.
- Cr—15 to 60 inches; light gray (2.5Y 7/2) semiconsolidated shale that crushes to silty clay, grayish brown (2.5Y 5/2) moist.

### Range in Characteristics

*Depth to the Cr horizon:* 10 to 20 inches

*Other features:* In cultivated areas, a silty clay loam texture results from mixing the A and C horizons.

#### A horizon

Hue: 10YR or 2.5Y  
Value: 5 or 6 dry; 3 or 4 moist  
Chroma: 1 or 2  
Clay content: 27 to 40 percent  
Reaction: pH 6.6 to 7.8

#### C horizons

Hue: 10YR, 2.5Y, or 5Y  
Value: 5 to 8 dry; 4 to 6 moist  
Chroma: 1 to 4  
Texture: Silty clay loam or silty clay  
Clay content: 35 to 50 percent  
Reaction: pH 7.4 to 8.4

### 162D—Yawdim silty clay loam, 4 to 15 percent slopes

#### Setting

*Landform:* Sedimentary plains and hills

*Slope:* 4 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Yawdim and similar soils: 85 percent

##### Minor Components

Very shallow clayey soils: 0 to 3 percent

Abor and similar soils: 0 to 3 percent

Cabbart and similar soils: 0 to 3 percent

Shallow noncalcareous soils: 0 to 3 percent

Moderately saline soils: 0 to 2 percent

Soils with slopes less than 4 percent: 0 to 1 percent

#### Major Component Description

*Surface layer texture:* Silty clay loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated shale residuum

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 262E—Yawdim-Blacksheep-Rock outcrop complex, 15 to 45 percent slopes

#### Setting

*Landform:*

- Yawdim—Hills
- Blacksheep—Hills
- Rock outcrop—Hills

*Position on landform:*

- Yawdim—Backslopes and shoulders
- Blacksheep—Backslopes and shoulders
- Rock outcrop—Summits

*Slope:*

- Yawdim—15 to 45 percent
- Blacksheep—15 to 45 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Yawdim and similar soils: 40 percent  
 Blacksheep and similar soils: 30 percent  
 Rock outcrop: 20 percent

#### Minor Components

Cabbart and similar soils: 0 to 2 percent  
 Abor and similar soils: 0 to 2 percent  
 Very shallow clayey soils: 0 to 2 percent  
 Moderately saline soils: 0 to 2 percent  
 Soils with stony surface layers: 0 to 1 percent  
 Soils with slopes less than 15 percent: 0 to 1 percent

### Major Component Description

#### Yawdim

*Surface layer texture:* Silty clay loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated shale residuum  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 2.6 inches

#### Blacksheep

*Surface layer texture:* Sandy loam  
*Depth class:* Shallow (10 to 20 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Semiconsolidated, sandy sedimentary beds  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 1.7 inches

#### Rock outcrop

*Definition:* Mainly consolidated sandstone and consolidated shale.

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Ynot Series

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Permeability:* Moderately rapid (2.0 to 6.0 inches/hour)

*Landform:* Alluvial fans, stream terraces, and sedimentary plains

*Parent material:* Alluvium or eolian deposits

*Slope range:* 0 to 15 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Coarse-loamy, mixed Aridic Haploborolls

### Typical Pedon

Ynot sandy loam, 2 to 8 percent slopes, in an area of rangeland, 2,500 feet south and 2,200 feet east of the northwest corner of sec. 35, T. 1 N., R. 58 E.

A—0 to 6 inches; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and common fine roots; many very fine tubular pores; neutral; clear smooth boundary.

Bw1—6 to 13 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate coarse and medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; many very fine and few fine roots; many very fine and common fine tubular pores; neutral; clear smooth boundary.

Bw2—13 to 18 inches; light yellowish brown (2.5Y 6/4) sandy loam, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common very fine and few fine roots; many very fine and common fine tubular pores; neutral; gradual smooth boundary.

C—18 to 60 inches; light yellowish brown (2.5Y 6/4) sandy loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, very friable, nonsticky, nonplastic; few very fine roots; common fine and few very fine pores; neutral.

### Range in Characteristics

*Soil temperature:* 42 to 47 degrees F  
*Moisture control section:* Between 12 and 35 inches  
*Thickness of the mollic epipedon:* 7 to 16 inches  
 (includes part of the Bw horizon)  
*Other features:* Some soils are calcareous below a depth of 40 inches.

#### A horizon

Hue: 10YR or 2.5Y  
 Value: 2 or 3 moist  
 Chroma: 2 or 3  
 Clay content: 10 to 18 percent  
 Reaction: pH 6.1 to 7.3

#### Bw horizons

Hue: 10YR or 2.5Y  
 Value: 5 to 7 dry; 3 to 6 moist  
 Chroma: 2 to 4  
 Texture: Sandy loam or fine sandy loam  
 Clay content: 10 to 18 percent  
 Reaction: pH 6.1 to 7.3

#### C horizon

Hue: 10YR, 2.5Y, or 5Y  
 Value: 5 to 7 dry; 4 to 6 moist  
 Chroma: 2 to 4  
 Texture: Sandy loam or fine sandy loam  
 Clay content: 10 to 18 percent  
 Reaction: pH 6.1 to 7.8

### 59A—Ynot sandy loam, 0 to 2 percent slopes

#### Setting

*Landform:* Stream terraces  
*Slope:* 0 to 2 percent  
*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Ynot and similar soils: 85 percent

##### Minor Components

Slightly saline soils: 0 to 3 percent  
 Soils with gravelly loam surface layers: 0 to 3 percent  
 Chinook and similar soils: 0 to 3 percent  
 Very deep sandy clay loam soil: 0 to 2 percent  
 Soils with lighter colored surface layers: 0 to 2 percent  
 Soils with calcareous surface layers: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or eolian material  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

#### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 59C—Ynot sandy loam, 2 to 8 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces  
*Slope:* 2 to 8 percent  
*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Ynot and similar soils: 85 percent

##### Minor Components

Slightly saline soils: 0 to 3 percent  
 Soils with gravelly loam surface layers: 0 to 3 percent  
 Chinook and similar soils: 0 to 3 percent  
 Areas of blowouts: 0 to 2 percent  
 Soils with calcareous surface layers: 0 to 2 percent  
 Soils with lighter colored surface layers: 0 to 2 percent

### Major Component Description

*Surface layer texture:* Sandy loam  
*Depth class:* Very deep (>60 inches)  
*Drainage class:* Well drained  
*Dominant parent material:* Alluvium or eolian material  
*Native plant cover type:* Rangeland  
*Flooding:* None  
*Available water capacity:* Mainly 7.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### 59D—Ynot sandy loam, 8 to 15 percent slopes

#### Setting

*Landform:* Alluvial fans and stream terraces

*Slope:* 8 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

#### Composition

##### Major Components

Ynot and similar soils: 85 percent

##### Minor Components

Chinook and similar soils: 0 to 3 percent

Blacksheep and similar soils: 0 to 3 percent

Areas of blowouts: 0 to 3 percent

Twilight and similar soils: 0 to 2 percent

Soils with calcareous surface layers: 0 to 2 percent

Soils with lighter colored surface layers: 0 to 2 percent

#### Major Component Description

*Surface layer texture:* Sandy loam

*Depth class:* Very deep (>60 inches)

*Drainage class:* Well drained

*Dominant parent material:* Alluvium or eolian material

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 7.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

### Zeona Series

*Depth class:* Very deep (>60 inches)

*Drainage class:* Excessively drained

*Permeability:* Rapid (6.0 to 20.0 inches/hour)

*Landform:* Sand dunes

*Parent material:* Eolian deposits

*Slope range:* 4 to 15 percent

*Annual precipitation:* 10 to 14 inches

**Taxonomic Class:** Mixed, frigid Typic Ustipsamments

#### Typical Pedon

Zeona loamy fine sand, in an area of Zeona-Blacksheep-Rock outcrop complex, 4 to 15 percent slopes, in an area of rangeland, 1,000 feet north and 500 feet east of the southwest corner of sec. 36, T. 4 N., R. 60 E.

A—0 to 5 inches; grayish brown (10YR 5/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky, nonplastic; many very fine roots; neutral; gradual wavy boundary.

C1—5 to 36 inches; light brownish gray (10YR 6/2) loamy fine sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky, nonplastic; common very fine roots; moderately alkaline; gradual wavy boundary.

C2—36 to 60 inches; light brownish gray (10YR 6/2) loamy fine sand; grayish brown (10YR 5/2) moist; single grain; loose, nonsticky, nonplastic; common very fine roots; slightly effervescent; moderately alkaline.

#### Range in Characteristics

*Features:* Evidence of recent wind action, such as thin dark layers and variations in textures are observable in some pedons

##### A horizon

Hue: 5Y, 2.5Y, 10YR, or 7.5YR

Value: 4 to 7 dry; 3 to 6 moist

Chroma: 2 to 4 or 6

Clay content: 0 to 10 percent

Reaction: pH 5.6 to 7.8

##### C horizons

Hue: 5Y, 2.5Y, 10YR, or 7.5YR

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 1 to 4

Texture: Loamy fine sand or fine sand

Clay content: 0 to 10 percent

Reaction: pH 6.1 to 8.4

### 119D—Zeona-Blacksheep-Rock outcrop complex, 4 to 15 percent slopes

#### Setting

*Landform:*

- Zeona—Sand dunes
- Blacksheep—Sedimentary plains and hills
- Rock outcrop—Hills

*Slope:*

- Zeona—4 to 15 percent
- Blacksheep—4 to 15 percent

*Mean annual precipitation:* 10 to 14 inches

### Composition

#### Major Components

Zeona and similar soils: 40 percent

Blacksheep and similar soils: 30 percent

Rock outcrop: 15 percent

#### Minor Components

Very shallow loamy soils: 0 to 3 percent

Twilight and similar soils: 0 to 3 percent

Busby and similar soils: 0 to 3 percent

Soils with darker-colored surface layers: 0 to 2 percent

Areas of blowouts: 0 to 2 percent

Moderately saline soils: 0 to 2 percent

### Major Component Description

#### Zeona

*Surface layer texture:* Loamy fine sand

*Depth class:* Very deep (>60 inches)

*Drainage class:* Excessively drained

*Dominant parent material:* Eolian deposits

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 5.4 inches

#### Blacksheep

*Surface layer texture:* Fine sandy loam

*Depth class:* Shallow (10 to 20 inches)

*Drainage class:* Well drained

*Dominant parent material:* Semiconsolidated, sandy sedimentary beds

*Native plant cover type:* Rangeland

*Flooding:* None

*Available water capacity:* Mainly 2.0 inches

#### Rock outcrop

*Definition:* Mainly consolidated sandstone.

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

### Management

For management information about this map unit, see appropriate sections in Part II of this publication.

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# Glossary

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**Ablation till.** Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

**Aeration, soil.** The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

**Aggregate, soil.** Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

**Alkali (sodic) soil.** (See Sodic (alkali) soil.)

**Alluvial fan.** A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and areal extent from mountains to gullied terrains on hillslopes.

**Alluvium.** Material, such as sand, silt, or clay, deposited on land by streams.

**Alpha,alpha-dipyridyl.** A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redox feature.

**Animal-unit-month (AUM).** The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

**Aquic conditions.** Current soil wetness characterized by saturation, reduction, and redox features.

**Area reclaim (in tables).** An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

**Argillite.** Weakly metamorphosed mudstone or shale.

**Aspect.** The direction in which a slope faces.

**Association, soil.** A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

**Available water capacity (available moisture capacity).** The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low .....	0 to 3.75
Low .....	3.75 to 5.0
Moderate .....	5.0 to 7.5
High .....	more than 7.5

**Avalanche chute.** The track or path formed by an avalanche.

**Backslope.** The geomorphic component that forms the steepest inclined surface and principal element of many hillslopes. Backslopes in profile are commonly steep and linear and descend to a footslope. In terms of gradational process, backslopes are erosional forms produced mainly by mass wasting and running water.

**Badland.** Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

**Basal area.** The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

**Basal till.** Compact glacial till deposited beneath the ice.

**Base saturation.** The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

**Base slope.** A geomorphic component of hills consisting of the concave to linear (perpendicular

to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

**Bedding planes.** Fine strata, less than 5-millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

**Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

**Bedrock-floored plain.** An extensive nearly level to gently rolling or moderately sloping area that is underlain by hard bedrock and has a slope of 0 to 8 percent.

**Bench terrace.** A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

**Blowout.** A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of cobbles or gravel. In some blowouts, the water table is exposed.

**Board foot.** A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

**Bottom land.** The normal flood plain of a stream, subject to flooding.

**Boulders.** Rock fragments larger than 2 feet (60 centimeters) in diameter.

**Bouldery.** Refers to a soil with .01 to 0.1 percent of the surface covered with boulders.

**Bouldery soil material.** Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments larger than 24 inches (60 centimeters) in diameter.

**Breaks.** The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

**Breast height.** An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

**Brush management.** Use of mechanical, chemical, or biological methods to reduce or eliminate competition from woody vegetation and thus to allow understory grasses and forbs to recover or to make conditions favorable for reseeding. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

**Cable yarding.** A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

**Calcareous soil.** A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

**Caliche.** A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

**California bearing ratio (CBR).** The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

**Canopy.** The leafy crown of trees or shrubs. (See Crown.)

**Capillary water.** Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

**Cation.** An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

**Cation-exchange capacity.** The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

**Channeled.** Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

**Channery soil material.** A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

**Chemical treatment.** Control of unwanted vegetation through the use of chemicals.

- Chiseling.** Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.
- Cirque.** A semicircular, concave, bowl-like area that has steep faces primarily resulting from erosive activity of a mountain glacier.
- Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeters in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
- Clayey soil.** Silty clay, sandy clay, or clay.
- Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.
- Claypan.** A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.
- Clearcut.** A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from the adjacent stands.
- Climax plant community.** The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.
- Closed depression.** A low area completely surrounded by higher ground and having no natural outlet.
- Coarse textured soil.** Sand or loamy sand.
- Cobble (or cobblestone).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.
- Cobbly soil material.** Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.
- Codominant trees.** Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.
- COLE (coefficient of linear extensibility).** (See Linear extensibility.)
- Colluvium.** Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.
- Commercial forest.** Forestland capable of producing 20 cubic feet or more per acre per year at the culmination of mean annual increment.
- Complex slope.** Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.
- Complex, soil.** A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.
- Concretions.** Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.
- Conglomerate.** A coarse-grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer-textured material. Conglomerate is the consolidated equivalent of gravel.
- Conservation cropping system.** Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.
- Conservation tillage.** Any tillage and planting system in which a cover of crop residue is maintained on at least 30 percent of the soil surface after planting in order to reduce the hazard of water erosion. In areas where soil blowing is the primary concern, a system that maintains a cover of at least 1,000 pounds of flat residue of small grain or the equivalent during the critical erosion period.
- Consistence, soil.** Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to

compression. Terms describing consistence are defined in the "Soil Survey Manual" (Soil Survey Division Staff, 1962).

**Consolidated sandstone.** Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

**Consolidated shale.** Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

**Contour stripcropping (or contour farming).** Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

**Control section.** The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

**Coprogenous earth (sedimentary peat).** Fecal material deposited in water by aquatic organisms.

**Corrosion.** Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

**Cover crop.** A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

**Crop residue management.** Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

**Cropping system.** Growing crops according to a planned system of rotation and management practices.

**Cross-slope farming.** Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

**Crown.** The upper part of a tree or shrub, including the living branches and their foliage.

**Culmination of the mean annual increment (CMAI).** The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

**Cutbanks cave (in tables).** The walls of excavations tend to cave in or slough.

**Decreasers.** The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

**Deep soil.** A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Deferred grazing.** Postponing grazing or resting grazing land for a prescribed period.

**Depth, soil.** Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

**Depth to rock (in tables).** Bedrock is too near the surface for the specified use.

**Dip slope.** A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

**Diversion (or diversion terrace).** A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

**Divided-slope farming.** A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

**Dominant trees.** Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

**Drainage class (natural).** Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

*Excessively drained.*—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

*Somewhat excessively drained.*—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown, and yields are low.

*Well drained.*—These soils have an intermediate water-holding capacity. They retain optimum

amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

*Moderately well drained.*—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well-drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

*Somewhat poorly drained.*—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

*Poorly drained.*—These soils commonly are so wet, at or near the surface, during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

*Very poorly drained.*—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except rice) unless a drainage system is installed.

**Drainage, surface.** Runoff, or surface flow of water, from an area.

**Drainageway.** An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

**Drumlin.** A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

**Duff.** A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

**Dune.** A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

**Ecological site.** An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

**Eluviation.** The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

**Endosaturation.** A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

**Eolian soil material.** Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

**Ephemeral stream.** A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

**Episaturation.** A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

**Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

*Erosion (geologic).* Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

*Erosion (accelerated).* Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

**Erosion pavement.** A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

**Escarpment.** A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

**Esker.** A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels

of a retreating glacier and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles in length and from 10 to 100 feet in height.

- Even aged.** Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.
- Excess fines (in tables).** Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.
- Excess salt (in tables).** Excess water-soluble salts in the soil that restrict the growth of most plants.
- Excess sodium (in tables).** Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.
- Extrusive rock.** Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.
- Fallow.** Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.
- Fast intake (in tables).** The rapid movement of water into the soil.
- Fertility, soil.** The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.
- Fibric soil material (peat).** The least decomposed of all organic soil material. Peat contains a large amount of well-preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.
- Field moisture capacity.** The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.
- Fine textured soil.** Sandy clay, silty clay, or clay.
- Firebreak.** Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.
- First bottom.** The normal flood plain of a stream, subject to frequent or occasional flooding.
- Flaggy soil material.** Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.
- Flagstone.** A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.
- Flood plain.** A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.
- Fluvial.** Of or pertaining to rivers; produced by river action, as a fluvial plain.
- Foothill.** A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.
- Footslope.** The geomorphic component that forms the inner, gently inclined surface at the base of a hillslope. The surface profile is dominantly concave. In terms of gradational processes, a footslope is a transitional zone between an upslope site of erosion (backslope) and a downslope site of deposition (toeslope).
- Forb.** Any herbaceous plant not a grass or a sedge.
- Forest cover.** All trees and other woody plants (underbrush) covering the ground in a forest.
- Forest type.** A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.
- Fragipan.** A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.
- Frost action (in tables).** Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.
- Genesis, soil.** The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.
- Giant ripple mark.** The undulating surface sculpture produced in noncoherent granular materials by currents of water and by the agitation of water in wave action during the draining of large glacial lakes, such as Glacial Lake Missoula.
- Glacial drift.** Pulverized and other rock material transported by glacial ice and then deposited.

Also, the sorted and unsorted material deposited by streams flowing from glaciers.

**Glacial outwash.** Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

**Glacial till.** Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

**Glaciated uplands.** Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.

**Glaciofluvial deposits.** Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

**Glaciolacustrine deposits.** Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

**Gleyed soil.** Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

**Grassed waterway.** A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

**Gravel.** Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

**Gravelly soil material.** Soil that is 15 to 35 percent, by volume, rounded or angular rock fragments up to 3 inches (7.6 centimeters) in diameter. Very gravelly soil is 35 to 60 percent gravel, and extremely gravelly soil is more than 60 percent gravel by volume.

**Grazeable forestland.** Land capable of sustaining livestock grazing by producing forage of sufficient quantity during one or more stages of secondary forest succession.

**Green manure crop (agronomy).** A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

**Ground water.** Water filling all the unblocked pores of the material below the water table.

**Gully.** A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

**Gypsum.** A mineral consisting of hydrous calcium sulfate.

**Habitat type.** An aggregation of all land areas capable of producing similar climax plant communities.

**Hard bedrock.** Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

**Hardpan.** A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

**Head out.** To form a flower head.

**Heavy metal.** Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

**Hemic soil material (mucky peat).** Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

**High-residue crops.** Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

**Hill.** A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well-defined outline; hillsides generally have slopes of more than 8 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

**Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual" (Soil Survey Division Staff, 1962). The major horizons of mineral soil are as follows:

*O horizon.*—An organic layer of fresh and decaying plant residue.

*A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

*E horizon.*—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

*B horizon.*—The mineral horizon below an A or E horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

*C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

*Cr horizon.*—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

*R layer.*—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

**Humus.** The well-decomposed, more or less stable part of the organic matter in mineral soils.

**Hydrologic soil groups.** Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

**Igneous rock.** Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

**Illuviation.** The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

**Impervious soil.** A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

**Increasesers.** Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasesers commonly are the shorter plants and the less palatable to livestock.

**Infiltration.** The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

**Infiltration capacity.** The maximum rate at which water can infiltrate into a soil under a given set of conditions.

**Infiltration rate.** The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

**Intake rate.** The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2 .....	very low
0.2 to 0.4 .....	low
0.4 to 0.75 .....	moderately low
0.75 to 1.25 .....	moderate
1.25 to 1.75 .....	moderately high
1.75 to 2.5 .....	high
More than 2.5 .....	very high

**Intermittent stream.** A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

**Invaders.** On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

**Irrigation.** Application of water to soils to assist in production of crops. Methods of irrigation are:

*Basin.*—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

*Border.*—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

*Controlled flooding.*—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

*Corrugation.*—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

*Drip (or trickle).*—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

*Furrow.*—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

*Sprinkler.*—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

*Subirrigation.*—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

*Wild flooding.*—Water, released at high points, is allowed to flow onto an area without controlled distribution.

**Kame.** A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

**Kame terrace.** A terracelike ridge consisting of stratified sand and gravel that were deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine and that remained after the disappearance of the ice. It is commonly pitted with kettles and has an irregular ice-contact slope.

**Lacustrine deposit.** Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

**Lake plain.** A surface marking the floor of an extinct lake, filled in by well-sorted, stratified sediments.

**Landslide.** The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

**Large stones (in tables).** Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

**Lateral moraine.** A ridgelike moraine carried on and deposited at the side margin of a valley glacier. It is composed chiefly of rock fragments derived

from the valley walls by glacial abrasion and plucking or by mass wasting.

**Leaching.** The removal of soluble material from soil or other material by percolating water.

**Linear extensibility.** Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at  $\frac{1}{3}$ - or  $\frac{1}{10}$ -bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

**Liquid limit.** The moisture content at which the soil passes from a plastic to a liquid state.

**Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Loamy soil.** Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

**Loess.** Fine-grained material, dominantly of silt-sized particles, deposited by wind.

**Low-residue crops.** Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

**Low strength.** The soil is not strong enough to support loads.

**Marl.** An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

**Masses.** Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redox concentration.

**Mean annual increment (MAI).** The average annual increase in volume of a tree during its entire life.

**Mechanical treatment.** Use of mechanical equipment for seeding, brush management, and other management practices.

- Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.
- Merchantable trees.** Trees that are of sufficient size to be economically processed into wood products.
- Metamorphic rock.** Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.
- Microhigh.** An area that is 2 to 12 inches higher than the adjacent microlow.
- Microlow.** An area that is 2 to 12 inches lower than the adjacent microhigh.
- Mineral soil.** Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.
- Minimum tillage.** Only the tillage essential to crop production and prevention of soil damage.
- Miscellaneous area.** An area that has little or no natural soil and supports little or no vegetation.
- Miscellaneous water.** A sewage lagoon, an industrial waste pit, a fish hatchery, or a similar water area.
- Moderately coarse textured soil.** Coarse sandy loam, sandy loam, or fine sandy loam.
- Moderately deep soil.** A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.
- Moderately fine textured soil.** Clay loam, sandy clay loam, or silty clay loam.
- Mollic epipedon.** A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.
- Moraine.** An accumulation of glacial drift in a topographic landform of its own, resulting chiefly from the direct action of glacial ice. Some types are lateral, recessional, and terminal.
- Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.
- Mottling, soil.** Areas of color that differ from the matrix color. These colors are commonly attributes retained from the geologic parent material. (See Redox features for indications of poor aeration and impeded drainage.)
- Mountain.** A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.
- Muck.** Dark, finely divided, well-decomposed organic soil material. (See Sapric soil material.)
- Mudstone.** Sedimentary rock formed by induration of silt and clay in approximately equal amounts.
- Munsell notation.** A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.
- Naturalized pasture.** Forestland that is used primarily for the production of forage for grazing by livestock rather than for the production of wood products. Overstory trees are removed or managed to promote the native and introduced understory vegetation occurring on the site. This vegetation is managed for its forage value through the use of grazing management principles.
- Neutral soil.** A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)
- Nutrient, plant.** Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.
- Observed rooting depth.** Depth to which roots have been observed to penetrate.
- Organic matter.** Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:
- |                      |                       |
|----------------------|-----------------------|
| Very low .....       | less than 0.5 percent |
| Low .....            | 0.5 to 1.0 percent    |
| Moderately low ..... | 1.0 to 2.0 percent    |
| Moderate .....       | 2.0 to 4.0 percent    |
| High .....           | 4.0 to 8.0 percent    |
| Very high .....      | more than 8.0 percent |
- Outwash plain.** An extensive area of glaciofluvial material that was deposited by meltwater streams.
- Overstory.** The trees in a forest that form the upper crown cover.
- Oxbow.** The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.
- Pan.** A compact, dense layer in a soil that impedes the movement of water and the growth of roots.

For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

**Parent material.** The unconsolidated organic and mineral material in which soil forms.

**Peat.** Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

**Ped.** An individual natural soil aggregate, such as a granule, a prism, or a block.

**Pedon.** The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

**Percolation.** The movement of water through the soil.

**Percolates slowly (in tables).** The slow movement of water through the soil, adversely affecting the specified use.

**Permeability.** The quality of the soil that enables water or air to move downward through the profile.

*Terms describing permeability are:*

Very slow .....	less than 0.06 inch
Slow .....	0.06 to 0.2 inch
Moderately slow .....	0.2 to 0.6 inch
Moderate .....	0.6 to 2.0 inches
Moderately rapid .....	2.0 to 6.0 inches
Rapid .....	6.0 to 20 inches
Very rapid .....	more than 20 inches

**pH value.** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

**Phase, soil.** A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

**Piping (in tables).** Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

**Plastic limit.** The moisture content at which a soil changes from semisolid to plastic.

**Plasticity index.** The numerical difference between the liquid limit and the plastic limit. The range of moisture content within which the soil remains plastic.

**Playa.** The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

**Plowpan.** A compacted layer formed in the soil directly below the plowed layer.

**Ponding.** Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

**Poor filter (in tables).** Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

**Poorly graded.** Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

**Potential natural community (PNC).** The biotic community that would become established on an ecological site if all successional sequences were completed without interferences by man under the present environmental conditions. Natural disturbances are inherent in its development. The PNC may include acclimatized or naturalized nonnative species.

**Potential rooting depth (effective rooting depth).** Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

**Prescribed burning.** The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

**Productivity, soil.** The capability of a soil for producing a specified plant or sequence of plants under specific management.

**Profile, soil.** A vertical section of the soil extending through all its horizons and into the parent material.

**Proper grazing use.** Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

**Quartzite, metamorphic.** Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

**Quartzite, sedimentary.** Very hard but unmetamorphosed sandstone consisting chiefly of quartz grains.

**Range condition.** The present composition of the plant community on a range site in relation to the

potential natural plant community for that site.  
(See Similarity index.)

**Range site.** (See Ecological site.)

**Rangeland.** Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

**Reaction, soil.** A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid .....	less than 3.5
Extremely acid .....	3.5 to 4.4
Very strongly acid .....	4.5 to 5.0
Strongly acid .....	5.1 to 5.5
Moderately acid .....	5.6 to 6.0
Slightly acid .....	6.1 to 6.5
Neutral .....	6.6 to 7.3
Slightly alkaline .....	7.4 to 7.8
Moderately alkaline .....	7.9 to 8.4
Strongly alkaline .....	8.5 to 9.0
Very strongly alkaline .....	9.1 and higher

**Recessional moraine.** A moraine formed during a temporary but significant halt in the retreat of a glacier.

**Red beds.** Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

**Redox concentrations.** Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

**Redox depletions.** Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

**Redox features.** Redox concentrations, redox depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

**Reduced matrix.** A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a

change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redox feature.

**Regeneration.** The new growth of a natural plant community, developing from seed.

**Regolith.** The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

**Relict stream terrace.** One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

**Relief.** The elevations or inequalities of a land surface, considered collectively.

**Residuum (residual soil material).** Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

**Rill.** A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

**Riser.** The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

**Riverwash.** Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

**Road cut.** A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

**Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, boulders, stones, cobbles, and gravel.

**Rock outcrop.** Exposures of bare bedrock other than lava flows and rock-lined pits.

**Root zone.** The part of the soil that can be penetrated by plant roots.

**Rooting depth (in tables).** Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

**Rubble land.** Areas that have more than 90 percent of the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. The areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders left by Pleistocene glaciation or by periglacial phenomena.

**Runoff.** The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called

ground-water runoff or seepage flow from ground water.

**Saline soil.** A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

**Salinity.** The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline .....	0 to 4
Slightly saline .....	4 to 8
Moderately saline .....	8 to 16
Strongly saline .....	more than 16

**Salty water (in tables).** Water that is too salty for consumption by livestock.

**Sand.** As a soil separate, individual rock or mineral fragments from 0.05 to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

**Sandstone.** Sedimentary rock containing dominantly sand-sized particles.

**Sandy soil.** Sand or loamy sand.

**Sapric soil material (muck).** The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

**Saturation.** Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

**Sawlogs.** Logs of suitable size and quality for the production of lumber.

**Scarification.** The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

**Scribner's log rule.** A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

**Sedimentary plain.** An extensive nearly level to gently rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

**Sedimentary rock.** Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

**Sedimentary uplands.** Land areas of bedrock formed from water- or wind-deposited sediments. They are higher on the landscape than the flood plain.

**Seepage (in tables).** The movement of water through soil. Seepage adversely affects the specified use.

**Semiconsolidated sedimentary beds.** Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

**Sequum.** A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

**Series, soil.** A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

**Shale.** Sedimentary rock formed by the hardening of a clay deposit.

**Shallow soil.** A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Sheet erosion.** The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

**Shelterwood system.** A forest management system requiring the removal of a stand in a series of cuts so that regeneration occurs under a partial canopy. After regeneration, a final cut removes the shelterwood and allows the stand to develop in the open as an even-aged stand. The system is well suited to sites where shelter is needed for regeneration, and it can aid regeneration of the more intolerant tree species in a stand.

**Shoulder.** The uppermost inclined surface at the top of a hillside. It is the transitional zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

**Shrink-swell.** The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

**Side slope.** A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

**Silica.** A combination of silicon and oxygen. The mineral form is called quartz.

**Silt.** As a soil separate, individual mineral particles that range in diameter from the upper limit of clay

(0.002 millimeters) to the lower limit of very fine sand (0.05 millimeters). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**Siltstone.** Sedimentary rock made up of dominantly silt-sized particles.

**Similar soils.** Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

**Similarity index.** A similarity index is the percentage of a specific vegetation state plant community that is presently on the site.

**Sinkhole.** A depression in the landscape where limestone has been dissolved.

**Site class.** A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

**Site curve (50-year).** A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 50 years old or are 50 years old at breast height.

**Site curve (100-year).** A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 100 years old or are 100 years old at breast height.

**Site index.** A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant or dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

**Skid trails.** Pathways along which logs are dragged to a common site for loading onto a logging truck.

**Slash.** The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

**Slickens.** Accumulations of fine textured material, such as material separated in placer-mine and ore-mill operations. Slickens from ore mills commonly consist of freshly ground rock that has undergone chemical treatment during the milling process.

**Slickensides.** Polished and grooved surfaces produced by one mass sliding past another. In

soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

**Slickspot.** A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is loamy or clayey, is slippery when wet, and is low in productivity.

**Slope.** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level .....	0 to 2 percent
Gently sloping .....	2 to 4 percent
Moderately sloping .....	4 to 8 percent
Strongly sloping .....	8 to 15 percent
Moderately steep .....	15 to 25 percent
Steep .....	25 to 45 percent
Very steep .....	more than 45 percent

**Slope (in tables).** Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

**Slow intake (in tables).** The slow movement of water into the soil.

**Slow refill (in tables).** The slow filling of ponds, resulting from restricted permeability in the soil.

**Small stones (in tables).** Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

**Sodic (alkali) soil.** A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

**Sodicity.** The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of  $\text{Na}^+$  to  $\text{Ca}^{++} + \text{Mg}^{++}$ . The degrees of sodicity and their respective ratios are:

Slight .....	less than 13:1
Moderate .....	13-30:1
Strong .....	more than 30:1

**Sodium adsorption ratio (SAR).** A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from

saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

**Soft bedrock.** Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

**Soil.** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

**Soil separates.** Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand .....	2.0 to 1.0
Coarse sand .....	1.0 to 0.5
Medium sand .....	0.5 to 0.25
Fine sand .....	0.25 to 0.10
Very fine sand .....	0.10 to 0.05
Silt .....	0.05 to 0.002
Clay .....	less than 0.002

**Solum.** The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

**Species.** A single, distinct kind of plant or animal having certain distinguishing characteristics.

**Stone line.** A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

**Stones.** Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

**Stony.** Refers to a soil containing stones in numbers that interfere with tillage, or stones cover .01 to 0.1 percent of the surface. Very stony means that 0.1 to 3.0 percent of the surface is covered with stones. Extremely stony means that 3 to 15 percent of the surface is covered with stones.

**Stony soil material.** Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

**Strath terrace.** A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

**Stream channel.** The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

**Stream terrace.** One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

**Strippcropping.** Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

**Structure, soil.** The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

**Stubble mulch.** Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

**Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.

**Subsoiling.** Tilling a soil below normal plow depth, ordinarily to shatter or loosen a layer that is restrictive to roots.

**Substratum.** The part of the soil below the solum.

**Subsurface layer.** Any surface soil horizon (A, E, AB, or EB) below the surface layer.

**Summer fallow.** The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

**Summit.** A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

- Surface layer.** The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”
- Tailwater.** The water directly downstream of a structure.
- Talus.** Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.
- Taxadjuncts.** Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.
- Terminal moraine.** A belt of thick glacial drift that generally marks the termination of important glacial advances.
- Terrace.** An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.
- Terrace (geologic).** An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.
- Terracette.** Small, irregular step-like forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may or may not be induced by trampling of livestock such as sheep or cattle.
- Texture, soil.** The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”
- Thin layer (in tables).** A layer of otherwise suitable soil material that is too thin for the specified use.
- Till plain.** An extensive, nearly level to gently rolling or moderately sloping area that is underlain by or consists of till and that has a slope of 0 to 8 percent.
- Tilth, soil.** The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.
- Toeslope.** The outermost inclined surface at the base of a hill. Toeslopes are commonly gentle and linear in profile.
- Too arid (in tables).** The soil is dry most of the time, and vegetation is difficult to establish.
- Topsoil.** The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.
- Trace elements.** Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.
- Trafficability.** The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.
- Tread.** The relatively flat terrace surface that was cut or built by stream or wave action.
- Tuff.** A compacted deposit that is 50 percent or more volcanic ash and dust.
- Understory.** Any plants in a forest community that grow to a height of less than 5 feet.
- Upland.** Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.
- Valley.** An elongated depressional area primarily developed by stream action.
- Valley fill.** In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.
- Variation.** Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.
- Varve.** A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.
- Very deep soil.** A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.
- Very shallow soil.** A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.
- Water bars.** Smooth, shallow ditches or depressional areas that are excavated at an angle across a

sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

**Water-spreading.** Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

**Weathering.** All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

**Well graded.** Refers to soil material consisting of coarse-grained particles that are well distributed over wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

**Wilting point (or permanent wilting point).** The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

**Windthrow.** The action of uprooting and tipping over trees by the wind.

# Accessibility Statement

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