



United States  
Department of  
Agriculture

Soil  
Conservation  
Service

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

# Soil Survey of Fremont County, East Part and Dubois Area, Wyoming





# How To Use This Soil Survey

## General Soil Map

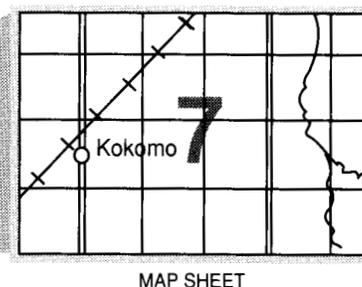
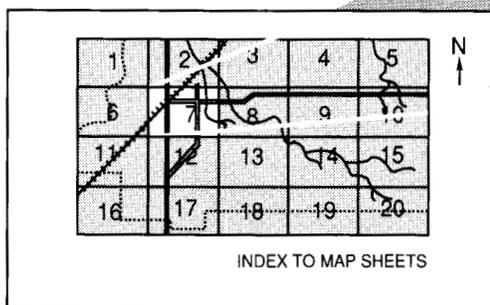
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

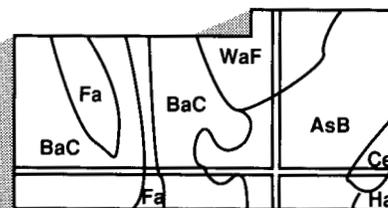
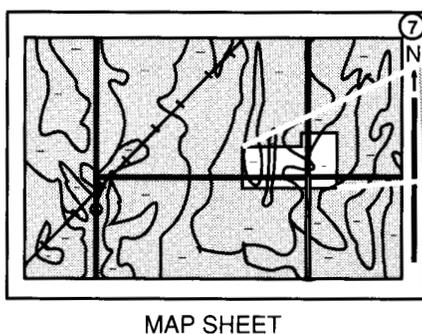
## Detailed Soil Maps

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

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **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 Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1983. Soil names and descriptions were approved in 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This survey was made cooperatively by the Soil Conservation Service; the United States Department of the Interior, Bureau of Land Management; and the University of Wyoming, Agricultural Experiment Station. It is part of the technical assistance furnished to the Dubois-Crowheart, Popo Agie, and Riverton Conservation Districts.

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.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

**Cover: Historic South Pass City, a legacy of the gold rush days of 1842. Venapass-Silas loams, 0 to 6 percent slopes, is in the drainageways, and Irigul-Midelight-Rock outcrop association, rolling, is on the hills.**

# Contents

---

<b>Index to map units</b> .....	v	Bluerim series.....	166
<b>Summary of tables</b> .....	viii	Bosler series.....	167
<b>Foreword</b> .....	xi	Bowbac series.....	167
General nature of the survey area.....	1	Brownsto series.....	168
How this survey was made.....	7	Burnette series.....	168
Survey procedures.....	8	Carmody series.....	169
<b>General soil map units</b> .....	9	Chittum series.....	169
Map unit descriptions.....	9	Cific series.....	170
<b>Detailed soil map units</b> .....	23	Clarkelen series.....	171
Map unit composition.....	23	Clifsand series.....	171
Map unit descriptions.....	24	Cloud Peak series.....	171
<b>Prime farmland</b> .....	143	Coalmont series.....	172
<b>Use and management of the soils</b> .....	145	Conpeak series.....	173
Hay and pasture.....	145	Countryman series.....	173
Rangeland.....	146	Coutis series.....	174
Woodland management and productivity.....	147	Crago series.....	174
Windbreaks and environmental plantings.....	147	Cragosen series.....	175
Recreation.....	149	Cryluha series.....	175
Wildlife habitat.....	150	Cushool series.....	176
Engineering.....	150	Dahlquist series.....	176
<b>Soil properties</b> .....	155	Decross series.....	177
Engineering index properties.....	155	Decross Variant.....	178
Physical and chemical properties.....	156	Diamondville series.....	178
Soil and water features.....	157	Effington series.....	179
<b>Classification of the soils</b> .....	159	Elkol series.....	179
Soil series and their morphology.....	159	Emblem series.....	180
Absher series.....	159	Farlow series.....	180
Absher Variant.....	160	Farlow Variant.....	181
Abston series.....	161	Forelle series.....	181
Almy series.....	161	Fornor series.....	182
Ansel series.....	162	Frisite series.....	183
Ansel Variant.....	163	Gelkie series.....	183
Apron series.....	163	Gelkie Variant.....	184
Asholler series.....	163	Glendive series.....	184
Bachus series.....	164	Granile series.....	185
Barrett Variant.....	164	Grippy series.....	185
Binton series.....	165	Haverdad series.....	186
Birdsley series.....	165	Havre series.....	186
Blackhall series.....	165	Havre Variant.....	187
Blazon series.....	166	Highpoint series.....	187

Hiland series .....	188	Rockinchair series .....	206
Hoodle series .....	188	Rock River series .....	207
Iceslew series .....	189	Roxal series .....	207
Inchau series .....	189	Ryan Park series .....	208
Irigul series .....	190	Ryan Park Variant .....	208
Lander series .....	190	Ryark series .....	209
Lander Variant .....	191	Saddle series .....	209
Lostwells series .....	191	Sandbranch series .....	210
Luhon series .....	192	Seaverson series .....	210
Lupinto series .....	192	Silas series .....	211
Lymanson series .....	193	Sinkson series .....	211
Midelight series .....	194	Starman series .....	211
Midelight Variant .....	194	Taluze series .....	212
Milren series .....	195	Thermopolis series .....	212
Milvar series .....	196	Tisworth series .....	213
Monbutte series .....	196	Tongue River series .....	213
Mosroc series .....	197	Uffens series .....	214
Mudray series .....	198	Uhl series .....	214
Muff series .....	198	Venapass series .....	215
Oceanet series .....	198	Vonalee series .....	215
Onason series .....	199	Wallson series .....	216
Orpha series .....	199	Winada Variant .....	216
Owen Creek series .....	200	Woosley series .....	217
Pensore series .....	200	Worland series .....	217
Persayo series .....	201	Youga series .....	218
Pesmore series .....	201	Youngston series .....	218
Peyton series .....	202	Zeomont series .....	219
Pishkun Variant .....	202	<b>Formation of the soils</b> .....	221
Poposhia series .....	203	Factors of soil formation .....	221
Quander series .....	203	Formation of soil horizons .....	223
Rairdent series .....	204	<b>References</b> .....	225
Rallod series .....	205	<b>Glossary</b> .....	227
Relsob series .....	205	<b>Tables</b> .....	237
Rentsac series .....	206		

Issued July 1993

# Index to Map Units

---

100—Absher-Elkol complex, 0 to 4 percent slopes . . . . .	24	126—Burnette loam, 3 to 10 percent slopes . . . . .	47
101—Absher-Poposhia-Sinkson complex, 1 to 10 percent slopes . . . . .	25	127—Chittum-Bachus-Rock outcrop association, hilly . . . . .	48
102—Absher Variant-Absher complex, 0 to 6 percent slopes . . . . .	26	128—Cific-Hoodle complex, sloping . . . . .	49
103—Abston-Diamondville complex, 1 to 12 percent slopes . . . . .	27	129—Clifsand-Persayo complex, hilly . . . . .	50
104—Almy loam, 0 to 6 percent slopes . . . . .	27	130—Cloud Peak-Farlow complex, 10 to 30 percent slopes . . . . .	51
105—Almy-Monbutte-Ralod complex, 1 to 10 percent slopes . . . . .	28	131—Coalmont-Milren-Cragosen complex, rolling . . .	51
106—Ansel-Ansel Variant complex, steep . . . . .	29	132—Conpeak-Rock outcrop-Cryluha complex, hilly . . . . .	52
107—Ansel-Rock outcrop complex, hilly . . . . .	30	133—Countryman-Absher complex, 0 to 3 percent slopes . . . . .	53
108—Apron-Lostwells complex, 0 to 10 percent slopes . . . . .	31	134—Coutis fine sandy loam, rolling . . . . .	55
109—Apron-Wallson-Worland association, 1 to 15 percent slopes . . . . .	32	135—Crago-Pensore association, undulating . . . . .	55
110—Aquic Cryofluvents-Ansel complex, 1 to 10 percent slopes . . . . .	33	136—Cragosen-Carmody-Blazon complex, hilly . . . . .	56
111—Badland . . . . .	33	137—Cragosen-Rock outcrop-Carmody complex, hilly . . . . .	57
112—Badland-Birdsley complex, steep . . . . .	34	138—Cragosen-Bosler-Cushool association, rolling . . . . .	58
113—Badland-Seaverson-Blazon complex, steep . . .	34	139—Cryluha-Conpeak association, 1 to 15 percent slopes . . . . .	59
114—Binton-Youngston clay loams, 0 to 3 percent slopes . . . . .	35	140—Cushool-Rock River association, 1 to 15 percent slopes . . . . .	60
115—Birdsley-Mudray complex, 3 to 15 percent slopes . . . . .	36	141—Dahlquist-Rock River complex, 1 to 12 percent slopes . . . . .	61
116—Blackhall-Rock outcrop complex, steep . . . . .	37	142—Diamondville-Forelle association, rolling . . . . .	62
117—Blackhall-Carmody association, hilly . . . . .	38	143—Effington-Mudray complex, 0 to 8 percent slopes . . . . .	63
118—Blazon-Rock outcrop-Carmody complex, hilly . . . . .	38	144—Emblem-Clifsand-Rairdent complex, 1 to 25 percent slopes . . . . .	63
119—Bluerim-Onason complex, hilly . . . . .	39	145—Fluvaquents . . . . .	64
120—Bosler-Rock River sandy loams, 1 to 8 percent slopes . . . . .	41	146—Fluvaquents-Youngston complex, 0 to 3 percent slopes . . . . .	65
121—Bosler-Ryan Park fine sandy loams, 1 to 8 percent slopes . . . . .	42	147—Forelle-Luhon loams, 1 to 10 percent slopes . . . . .	66
122—Bowbac-Hiland complex, rolling . . . . .	43	148—Forelle-Poposhia association, 2 to 12 percent slopes . . . . .	67
123—Brownsto loam, 0 to 6 percent slopes . . . . .	44	149—Fornor-Decross complex, hilly . . . . .	68
124—Brownsto sandy clay loam, 1 to 10 percent slopes . . . . .	45	150—Frisite-Emblem loams, 1 to 8 percent slopes . . . . .	69
125—Brownsto very bouldery-Decross Variant-Brownsto complex, hilly . . . . .	46		

151—Frisite-Youngston complex, 1 to 8 percent slopes.....	70	175—Milvar-Milren complex, 1 to 6 percent slopes.....	93
152—Gelkie Variant-Barrett Variant association, undulating .....	71	176—Mosroc-Lymanon association, hilly .....	93
153—Granile-Ansel complex, hilly .....	72	177—Oceanet-Rock outcrop-Persayo complex, hilly .....	94
154—Griffy-Saddle-Wallson association, undulating .....	73	178—Orpha-Vonalee complex, hilly .....	95
155—Haplaquolls-Aquic Ustifluvents complex, nearly level .....	74	179—Owen Creek very stony clay loam, 2 to 15 percent slopes .....	96
156—Haverdad-Clarkelen complex, 0 to 3 percent slopes .....	75	180—Pensore-Rock outcrop complex, hilly .....	97
157—Havre-Absher-Forelle loams, 0 to 6 percent slopes.....	76	181—Persayo-Rock outcrop complex, hilly .....	98
158—Havre-Forelle-Glendive complex, 0 to 3 percent slopes .....	77	182—Pesmore-Rock outcrop-Asholler complex, steep .....	98
159—Havre-Havre Variant-Elkol complex, 0 to 3 percent slopes .....	78	183—Peyton sandy loam, 1 to 10 percent slopes....	99
160—Highpoint-Rock outcrop complex, steep .....	79	184—Pishkun Variant-Hoodle complex, hilly .....	100
161—Hiland sandy loam, 1 to 15 percent slopes ....	80	185—Poposhia loam, 1 to 6 percent slopes .....	101
162—Hoodle-Rock outcrop complex, 1 to 8 percent slopes .....	80	186—Poposhia-Blazon-Carmody complex, hilly ....	101
163—Hoodle-Gelkie association, 2 to 15 percent slopes.....	81	187—Poposhia, sodic-Blazon complex, rolling .....	103
164—Iceslew-Countryman complex, 0 to 3 percent slopes .....	82	188—Quander-Youga-Onason complex, steep .....	103
165—Inchau-Youga loams, 10 to 30 percent slopes.....	83	189—Rallod-Rock outcrop-Seaverson complex, hilly .....	105
166—Irigul-Midelight-Rock outcrop association, rolling .....	84	190—Relsob-Bluerim sandy loams, 1 to 10 percent slopes .....	105
167—Irigul-Rock outcrop complex, steep .....	85	191—Rentsac-Carmody complex, hilly .....	106
168—Lander-Lander Variant loams, 0 to 3 percent slopes .....	85	192—Riverwash-Aquic Ustifluvents complex, nearly level.....	107
169—Luhon-Rock River-Forelle complex, undulating .....	86	193—Rockinchair-Rock outcrop-Sinkson complex, hilly .....	108
170—Lupinto loam, 1 to 6 percent slopes .....	87	194—Rockinchair-Sinkson loams, 1 to 15 percent slopes .....	109
171—Lymanson-Abston-Gelkie association, hilly ....	88	195—Rock outcrop-Asholler complex, steep .....	110
172—Lymanson-Conpeak association, rolling .....	89	196—Rock outcrop-Blackhall complex, hilly.....	111
173—Midelight Variant-Winada Variant-Starman gravelly loams, steep .....	90	197—Rock outcrop-Blazon complex, hilly.....	111
174—Milren-Bosler-Rock River sandy loams, 1 to 12 percent slopes .....	92	198—Rock outcrop-Mosroc complex, hilly .....	112
		199—Rock outcrop-Oceanet complex, hilly .....	113
		200—Roxal-Rock outcrop complex, steep .....	113
		201—Roxal-Tongue River complex, hilly .....	114
		202—Ryan Park loamy fine sand, undulating .....	115
		203—Ryan Park-Carmody association, 1 to 15 percent slopes .....	116
		204—Ryark sandy loam, 1 to 6 percent slopes....	116

---

205—Ryark-Zeomont loamy sands, rolling.....	117	218—Venapass-Uhl-Absher loams, 1 to 6 percent slopes .....	130
206—Sandbranch-Ryan Park Variant-Poposhia complex, 1 to 8 percent slopes .....	118	219—Venapass-Silas loams, 0 to 6 percent slopes .....	132
207—Sinkson-Almy sandy clay loams, 0 to 6 percent slopes .....	119	220—Vonalee-Hiland complex, undulating.....	133
208—Sinkson-Almy-Thermopolis association, rolling .....	121	221—Woosley-Decross-Starman association, rolling .....	134
209—Starman-Rock outcrop-Woosley complex, steep .....	122	222—Worland-Oceanet-Persayo association, rolling .....	135
210—Taluce-Bowbac sandy loams, hilly.....	123	223—Youga-Quander complex, 2 to 25 percent slopes .....	136
211—Thermopolis-Sinkson association, hilly .....	124	224—Youngston-Effington loams, 0 to 6 percent slopes .....	137
212—Tisworth-Absher-Forelle complex, 0 to 6 percent slopes .....	124	225—Youngston-Lostwells-Apron complex, 0 to 3 percent slopes .....	138
213—Tisworth-Poposhia complex, undulating .....	125	226—Youngston-Lostwells complex, 1 to 3 percent slopes .....	139
214—Tisworth-Ryan Park-Countryman complex, gently undulating.....	126	227—Youngston-Persayo loams, rolling .....	140
215—Tongue River-Inchau-Farlow Variant complex, 10 to 30 percent slopes .....	128	228—Zeomont loamy sand, hilly.....	141
216—Uffens-Muff-Frisite loams, 1 to 12 percent slopes .....	129	229—Dumps, mine.....	142
217—Uhl-Gelkie loams, 1 to 8 percent slopes .....	130	230—Pits, gravel .....	142

# Summary of Tables

---

Freeze dates in spring and fall (table 1) . . . . .	238
<i>Probability. Temperature.</i>	
Acreeage and proportionate extent of the soils (table 2) . . . . .	241
<i>Acres. Percent.</i>	
Land capability and yields per acre of hay and pasture (table 3) . . . . .	244
<i>Land capability. Grass hay. Pasture.</i>	
Expected heights of selected woody species at age 20, by suitability group, in planting zones I, II, and III (table 4) . . . . .	256
Windbreak suitability groups and planting zones (table 5) . . . . .	265
Recreational development (table 6) . . . . .	274
<i>Camp areas. Picnic areas. Playgrounds. Paths and trails.</i>	
Building site development (table 7) . . . . .	295
<i>Shallow excavations. Dwellings without basements. Dwellings with basements. Small commercial buildings. Local roads and streets. Lawns and landscaping.</i>	
Sanitary facilities (table 8) . . . . .	315
<i>Septic tank absorption fields. Sewage lagoon areas. Trench sanitary landfill. Area sanitary landfill. Daily cover for landfill.</i>	
Construction materials (table 9) . . . . .	336
<i>Roadfill. Sand. Gravel. Topsoil.</i>	
Water management (table 10) . . . . .	357
<i>Limitations for—Pond reservoir areas; Embankments, dikes, and levees; Aquifer-fed excavated ponds. Features affecting—Drainage, Irrigation.</i>	
Engineering index properties (table 11) . . . . .	377
<i>Depth. USDA texture. Classification—Unified, AASHTO. Fragments greater than 3 inches. Percentage passing sieve number—4, 10, 40, 200. Liquid limit. Plasticity index.</i>	

---

Physical and chemical properties of the soils (table 12).....	411
<i>Depth. Clay. Moist bulk density. Permeability. Available water capacity. Soil reaction. Salinity. Shrink-swell potential. Erosion factors. Wind erodibility group. Organic matter.</i>	
Soil and water features (table 13) .....	432
<i>Hydrologic group. Flooding. High water table. Bedrock. Potential frost action. Risk of corrosion.</i>	
Classification of the soils (table 14).....	448
<i>Family or higher taxonomic class.</i>	



# Foreword

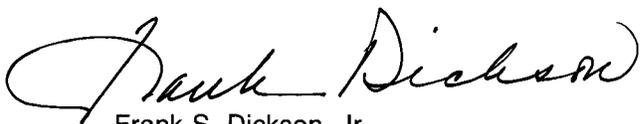
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This soil survey provides information that can be used in land-planning programs in the survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

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.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow over bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to 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. Broad areas of soils are shown on the general soil map. 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 the local office of the Soil Conservation Service or the Cooperative Extension Service.



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# Soil Survey of Fremont County, East Part and Dubois Area, Wyoming

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United States Department of Agriculture, Soil Conservation Service,  
in cooperation with  
United States Department of the Interior, Bureau of Land Management, and  
University of Wyoming, Agricultural Experimental Station

This survey area is in the west-central part of Wyoming (fig. 1). It includes nearly all of Fremont County, except for the Wind River Indian Reservation, the Shoshone National Forest, and the Lander and Riverton soil survey areas. The Dubois area, which is part of Fremont County, is separated from the rest of the survey area by the Wind River Indian Reservation. It is 110,000 acres of private land and 50,000 acres of land administered by the Bureau of Land Management. It is too small to be mapped as a separate soil survey. Much of the survey area is publicly owned land.

The total extent of the survey area is 2,594,275 acres, or about 4,054 square miles. About 96 percent of the area is rangeland. The rest is forest land, irrigated hayland or pasture, urban land, water areas, roads, and mines.

Dubois and Shoshoni are the largest towns in the survey area. Other communities are Atlantic City, South Pass City, Bonneville, Lost Cabin, Lysite, Moneta, Sand Draw, and Jeffrey City.

## General Nature of the Survey Area

This section gives general information about the survey area. It describes history; transportation facilities; natural resources; physiography, relief, and drainage; geology; and climate.

### History

The Indians were the first land users in this survey area. They harvested wildlife for food and clothing and developed homesites and villages. They are still using the land for these purposes.

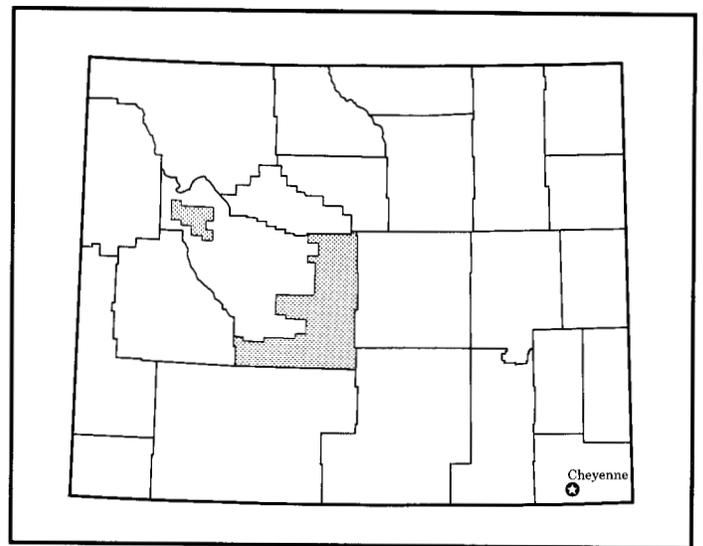


Figure 1.—Location of the east part and the Dubois area of Fremont County in Wyoming.

Ranchers and other settlers came into the survey area in the latter half of the 19th century. Cattle were first introduced by William Sublette in 1829, when he brought four head of milk cows to an area along the Popo Agie River (6). In 1869, William Boyd brought in the first herd of cattle in order to provide food for the miners at the South Pass gold fields. Sheep were introduced in 1870. Currently, the rangeland and the irrigated hayland and pasture support an important and diversified livestock industry.

Fremont County was established on March 5, 1884

(4). The town of Dubois, which has a population of 1,067, was founded when a post office was built in 1886. Frank Welty opened the first general store in 1889 and was one of the first ranchers in the survey area. John Burlingham was the first to settle in the DuNoir Valley. Agriculture and lumber are still important to the town, and building resort homes and tourism are growing businesses.

Shoshoni, which has a population of 879, was incorporated on April 2, 1906. The first building, the Elk Horn Hotel, was erected in 1905 (3, 6). Early settlers began ranching in 1896. Currently, Shoshoni provides goods and services to farmers, ranchers, and people visiting the survey area for recreational purposes.

South Pass City, which has a population of 12, and Atlantic City, which has a population of 50, are ghost towns established during the gold rush days of 1842. Miners and stockmen obtained some supplies in these towns between 1842 and 1956. Jeffrey City, which has a population of 1,882, was established about 1958 as a result of uranium mining. It supplies goods and services for ranchers, for the mining industry, and for recreational activities, such as hunting, fishing, and rock hounding.

Bonneville, which has a population of 50, Lost Cabin, which has a population of 30, Lysite, which has a population of 120, and Moneta, which has a population of 10, were stops for trail herds of cattle and sheep between 1870 and 1900. After the railroad arrived in 1906, these towns became shipping points for the livestock industry. Currently, Sand Draw, which has a population of 15, Bonneville, and Lost Cabin are primarily "oil camps" for the nearby oil fields.

## Transportation Facilities

The major highways in the survey area are U.S. Highways 20, 26, and 287 and Wyoming Highways 28 and 789. The area has several other highways, county roads, and farm-to-market roads.

A railroad crosses the northern part of the survey area from Moneta to Bonneville. It splits at Bonneville, from which one track extends to Riverton and the other extends to Thermopolis and to Billings, Montana. A special line hauling taconite from Atlantic City to Rock Springs crosses the western part of the survey area.

Transcontinental bus service is available in Shoshoni. A local bus line provides service between Shoshoni and another transcontinental bus line in Rock Springs. Airports in Lander and Riverton, which are just outside the survey area, provide service to Billings, Montana; Salt Lake City, Utah; Denver, Colorado; and other cities.

## Natural Resources

Soil is the most important natural resource in the survey area. It provides a growing medium for the vegetation in areas of rangeland and in areas of irrigated pasture and hayland. The rangeland and irrigated pasture are grazed by cattle, sheep, wild horses, and wildlife. The irrigated hayland provides supplemental winter feed for livestock. Other natural resources include natural gas, oil, water, timber, uranium, gravel, gold, jade, copper, and coal.

Water for livestock, domestic purposes, and wildlife is supplied by several perennial streams and springs and by numerous small livestock watering ponds. The number of areas where ground water is available and the amount of available water are limited. Intermittent drainageways provide water for short periods in spring and after thundershowers.

Some timber is harvested in areas on Green Mountain and around Dubois and Atlantic City, which are in general soil map unit 3. Several small sawmills operate in Dubois, in Shoshoni, and in Lander and Riverton.

The Wind and Sweetwater Rivers and their tributaries supply most of the livestock and irrigation water in the survey area. Domestic water for the various communities is drawn from wells. Many ranchers use surface water from livestock ponds and ground water from wells.

Uranium, jade, and gravel are surface mined in the survey area. Jade is common in areas of general soil map unit 21. Gravel is mined in areas of general soil map units 5, 17, and 23. Many abandoned gold mine shafts are on the western part of the Sweetwater Arch. Small gold-dredging enterprises are still active along the drainageways. Several abandoned coal mines are north and east of Lander. Several oil and gas fields are in the Shoshone Basin and on the eastern side of the Sweetwater Arch. Oil and gas exploration and production are major industries in the survey area.

## Physiography, Relief, and Drainage

This survey area is part of the Middle Rocky Mountains physiographic province. This province includes the Wyoming Basin (5), which is drained by the Wind and Sweetwater Rivers. The part of the Wyoming Basin that is in the survey area can be divided into the Wind River Basin, the Sweetwater Arch, the Shoshone Basin, the Great Divide Basin, and the Green Mountains (fig. 2). The Shoshone Basin is the eastern extension of the Wind River Basin. The mountains and foothills in the survey area rise steeply from the floor of

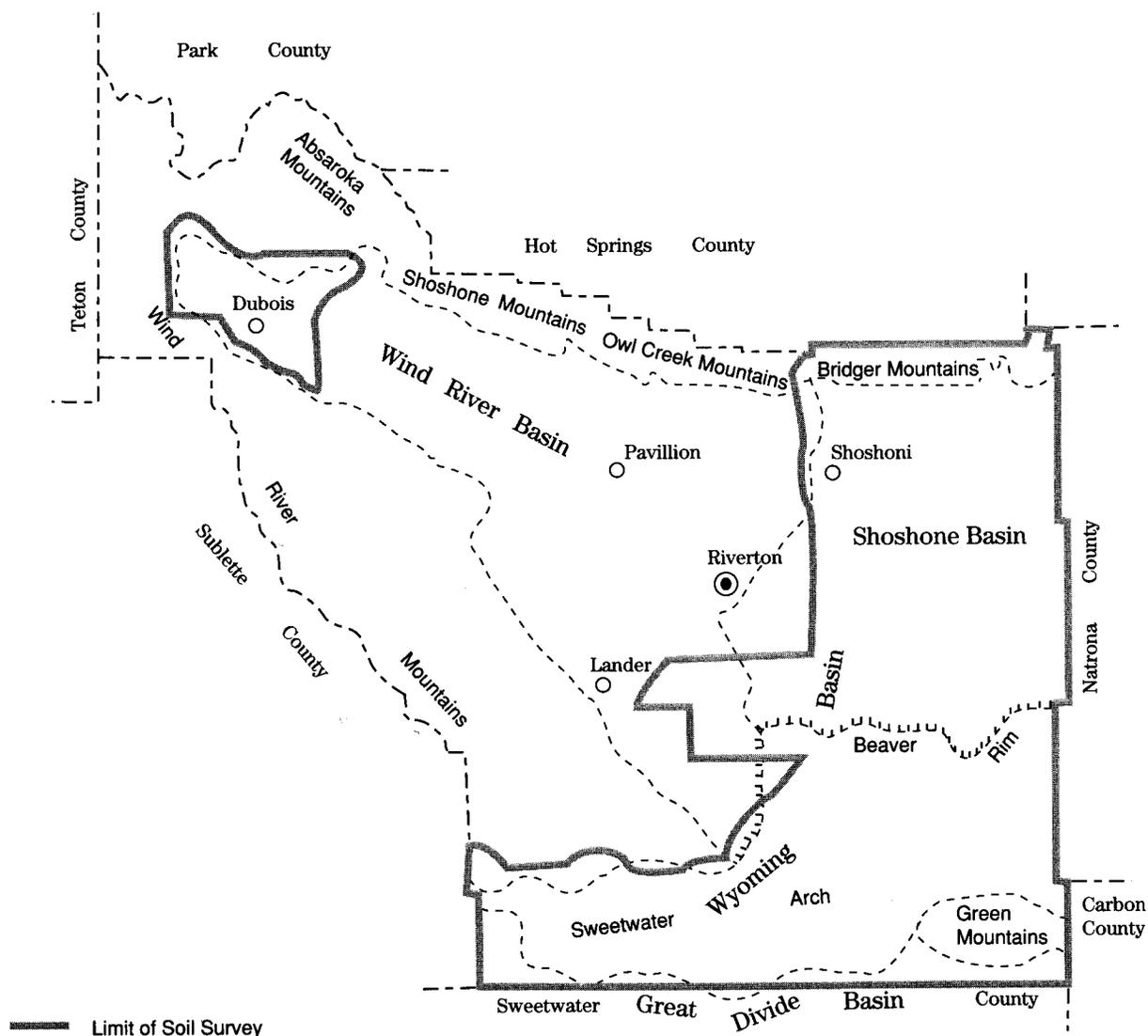


Figure 2.—Major physiographic regions in the survey area.

the Wind River and Great Divide Basins.

The Shoshone Basin is bordered on the south by Beaver Rim and the Rattlesnake Mountains and on the north by the Bridger and Big Horn Mountains. To the east of the survey area, this basin is separated from the Great Plains by the Oil Mountain anticline.

The Dubois area is at the western end of the Wind River Basin. It lies between the Shoshone and Absaroka Mountains to the north and the Wind River Mountains to the south.

The Sweetwater Arch, which is south of Beaver Rim and north of the Great Divide Basin, is drained by the Sweetwater River. The Great Divide Basin is along the southern boundary of the survey area.

Relief in the survey area is characterized by the uplifted blocks of the Wind River, Bridger, and Shoshone Mountains and the associated intermontane basins. The lowest point in the survey area, at Boysen Reservoir, is 4,740 feet above mean sea level. Some elevations at summits in the survey area are 8,231 feet in the Bridger Mountains, 8,558 feet on the Oregon Buttes, 9,040 feet in the Green Mountains, and 9,000 feet in the Dubois area, near the DuNoir River. The lowest point in the Dubois area, along the Wind River near Blue Hole, is 6,429 feet.

The northern half of the survey area is drained by the Wind River and its tributaries, which include Beaver, Poison, Badwater, and Tuff Creeks. The northern slope

of the Bridger Mountains is drained by Red Creek and the Nowood River. The southern half of the survey area is drained by the Sweetwater River and its tributaries, which include Sage Hen, Crooks, Alkali, Long, Willow, Rock, and Pine Creeks. In the southern part of the survey area, Lost and Red Creeks drain into the hydrologically closed Great Divide Basin. The southwestern corner of the survey area is drained by the Green River and its tributaries, which include Pacific and Hay Creeks. The Dubois area is drained by the Wind River and its tributaries, which include the East Fork of the Wind River and Horse, DuNoir, Warm Spring, and Torrey Creeks.

The soils in the Shoshone Basin have a mesic temperature regime. The soils in the mountainous areas at Dubois, in the Bridger and Green Mountains, and on the western side of the Sweetwater Arch have a cryic temperature regime. The rest of the soils of the survey area have a frigid temperature regime.

## Geology

The soils in the survey area formed in a variety of geologic materials. Along the northern border of the survey area, in the Bridger Mountains, are outcrops of Precambrian granite, gneiss, and schist, as well as resistant Paleozoic strata of the Cambrian Flathead Sandstone, the Ordovician Big Horn Dolomite, the Mississippian Madison Limestone, and poorly indurated Tertiary sandstone and variegated shale of the Wind River Formation.

The Shoshone Basin extends south from the base of the Bridger Mountains for a distance of about 50 miles. The northern part of the basin is underlain by interbedded sandstone and varicolored shale of the Tertiary Wind River Formation. Some beds in this formation are sodic. The southern part of the basin, extending to Beaver Rim, is underlain mainly by interbedded sandstone and shale of the Upper Cretaceous Cody Shale and Mesaverde Formation.

The southern part of the survey area is underlain by the White River Formation (8, 15). Included in this part of the survey area are outcrops of Precambrian crystalline rock, north of Jeffrey City, and of the Tertiary Crooks Gap Conglomerate, south of Jeffrey City, in the Green Mountains.

The Dubois area is underlain dominantly by varicolored interbedded sandstone and shale of the Tertiary Indian Meadows and Wind River Formations. Adjacent to the northern and southern boundaries of the survey area are outcrops of the Mississippian Madison Limestone, sandstone and shale of the Pennsylvanian Amsden Formation, and brick red sandstone and siltstone of the Triassic Chugwater Formation.

## Climate

By Jon Werner, water supply forecast specialist, Soil Conservation Service.

The climate in the eastern part of Fremont County is typical of that on high mountain plains and foothills situated on the leeward side of mountains that uplift storm masses. The average annual precipitation is 8 to 12 inches in most areas, but it ranges from less than 6 inches to more than 20 inches.

The average annual precipitation as recorded by National Weather Service stations at Boysen Dam, Lander, Riverton, and Shoshoni is 9.31 inches. The period May through August receives 48 percent (4.46 inches) of the average annual precipitation. December, January, and February receive the smallest amount, less than one-third of an inch per month. The precipitation received during the period November through March, less than 2 inches total, generally is in the form of snow. Snowpack is seldom of significant duration below an elevation of 8,000 feet.

Temperatures in the eastern part of Fremont County range from more than 100 degrees F to less than -40 degrees. Data recorded at the Boysen Dam, Riverton, and Lander stations were averaged monthly to generate the temperature plots shown in figure 3. May 15 through August 27 (103 days) is the average period when conditions are expected to be suitable for growing crops; that is, when the average minimum daily temperature is not expected to go below 45 degrees. Freezing temperatures have occurred, however, in all months, except for July and August. Average daily temperatures range from 17 degrees in January to 73 degrees in July. The probable dates of the first freeze in fall and the last freeze in spring at Boysen Dam, Dubois, Muddy Gap, Sand Draw, and South Pass City are given in table 1.

The Dubois area consists of a high mountain valley that is very dry. Dubois receives an average annual precipitation of less than 9 inches. This part of the survey area is cooler than the eastern part of Fremont County.

The average annual precipitation in the Dubois area ranges from less than 9 inches to more than 30 inches. December, January, and February receive the lowest precipitation, less than 0.30 inch (fig. 4). From November through March, the precipitation generally is in the form of snow and snowpacks form at elevations of more than about 8,000 feet.

Temperatures at the Dubois Weather Station range from a high of 98 degrees to a low of -48 degrees. There is normally no period when the average minimum temperature is expected to be more than 45 degrees.

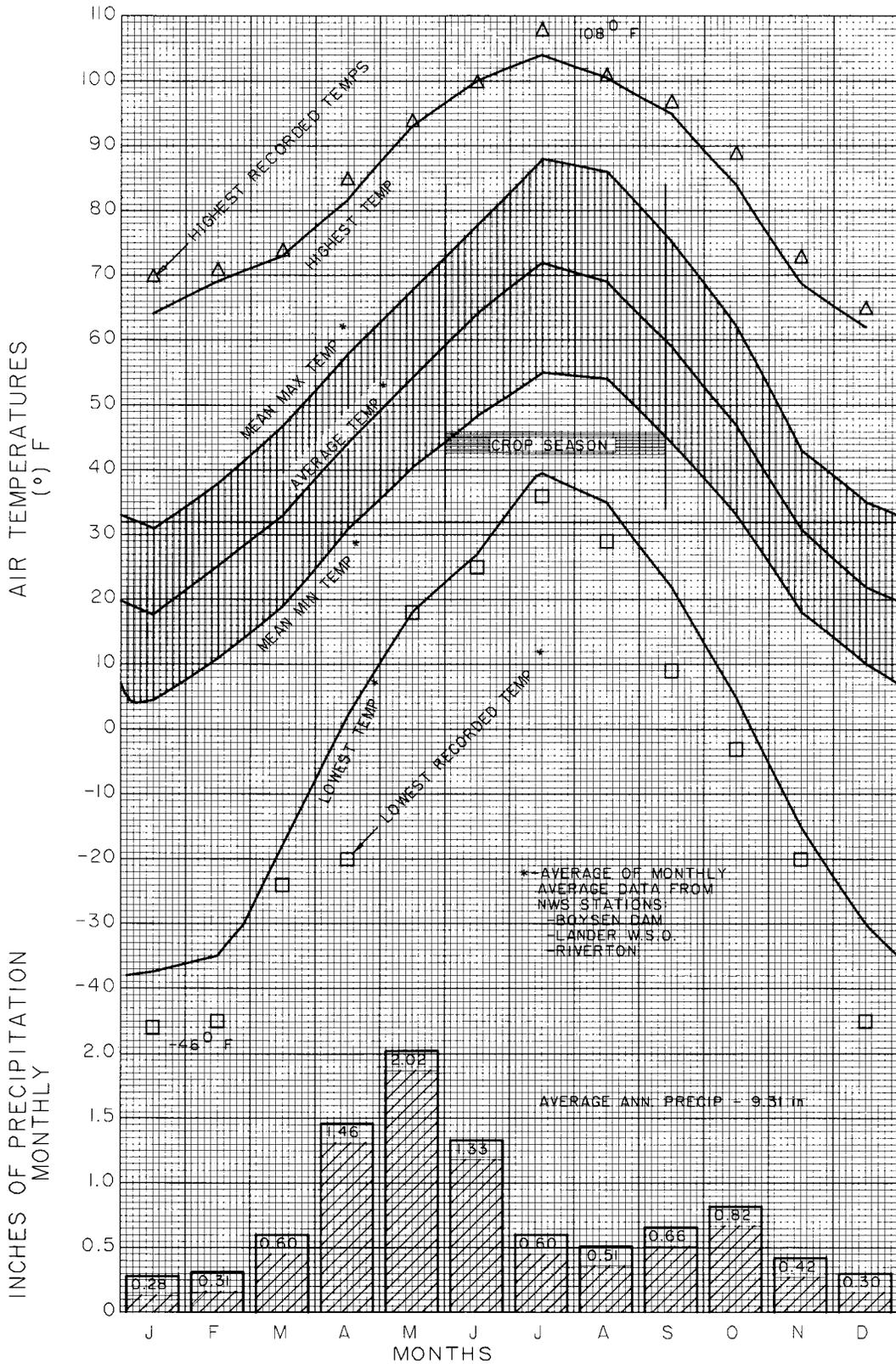


Figure 3.—Precipitation and air temperatures for the eastern part of Fremont County.

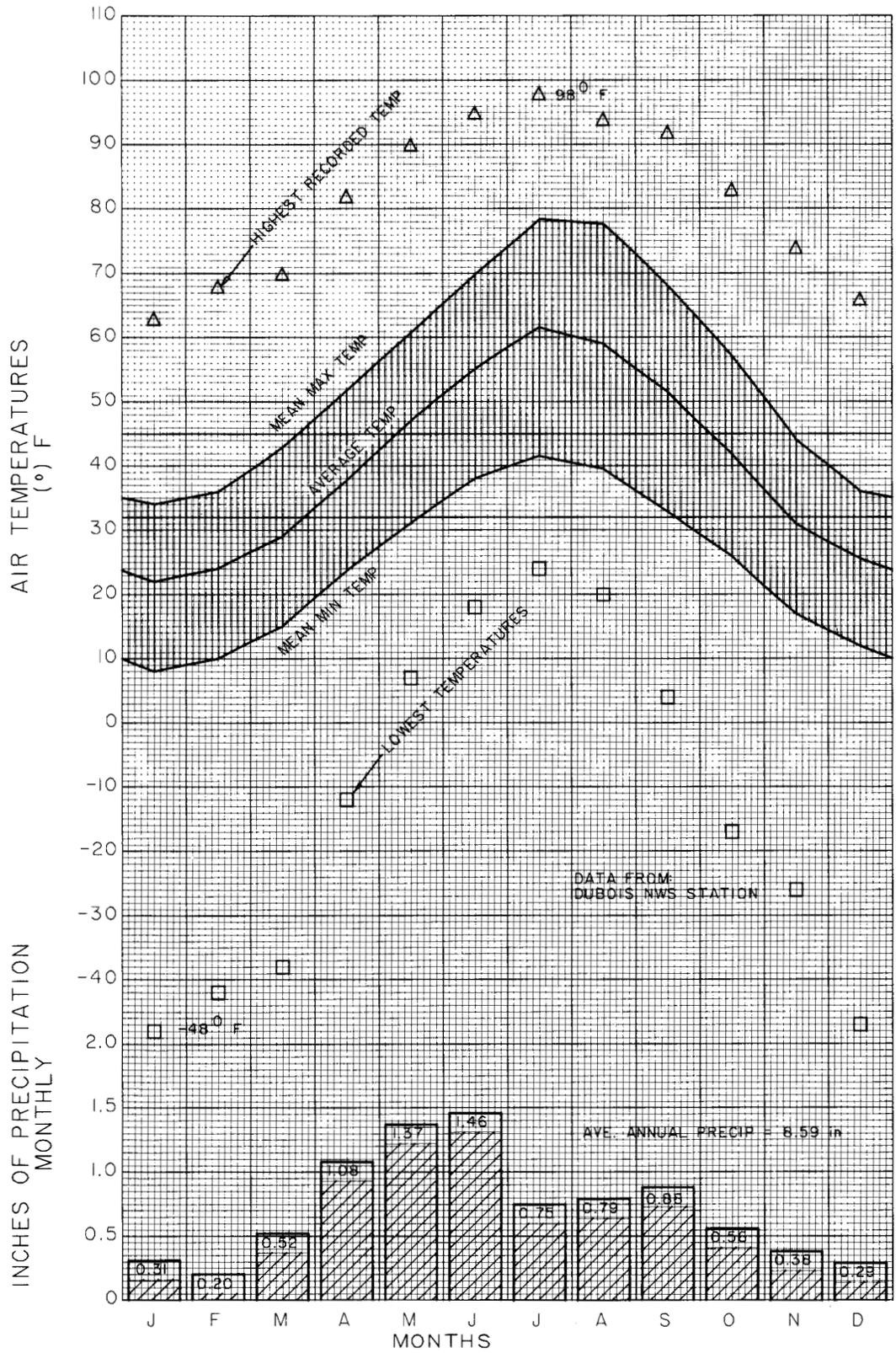


Figure 4.—Precipitation and air temperatures for the Dubois area.

Hard, freezing temperatures have occurred in every month of the year. Average daily temperatures range from 22 degrees in January to 62 degrees in July. The probable dates of the first freeze in fall and the last freeze in spring at Dubois are given in table 1.

The arid and semiarid plain and foothill parts of the survey area receive more than 50 percent of their total precipitation in the period April through June. Cool, moist conditions in spring favor the growth of native vegetation. Summer is hot and dry, and most of the precipitation received during this season is in the form of thundershowers. Winds are common in the Dubois and Sweetwater areas.

The subhumid mountain areas receive most of their precipitation in the form of snow. Snow is not uncommon during June in the Dubois area and in the southern part of the survey area.

The average annual precipitation at other weather stations in the survey area is as follows: Lysite, 5.05 inches; Oregon Trail Crossing, 7.97 inches; and Shoshoni, 5.59 inches. A survey of the Riverton area provides additional climatic information about the Shoshone Basin (11). A survey of the Lander area provides climatic information applicable to the central portion of the eastern part of Fremont County (13).

## How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The 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 area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist 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 gradually 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, the 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 the data from these analyses and tests as well as the field-observed characteristics and the 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 on crop yields under defined levels of management are assembled from farm records and from field or plot experiments 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 of time, 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.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of 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.

## Survey Procedures

The general procedures used to make this survey are described in the "National Soils Handbook" (14) and the "Soil Survey Manual" (9). A general soil map of Wyoming was used as a reference (16).

Before fieldwork began, a general soil map of the survey area was developed. The units on this map were delineated on the basis of landforms, geology, climate, and a general knowledge of the survey area. They consisted of soils classified to the subgroup level. The scale of this map was 1:253,440, or 0.25 inch per mile. Each year after the mapping season, soil scientists

updated the map at the series level, using the more detailed mapping just completed as a guide.

Aerial photographs of the survey area, on which the field mapping would be done, were gathered and organized, and join lines were applied. Several scales of photographs were used in field mapping because of a lack of coverage. The scales of the photographs used were 2 inches per mile, 2.64 inches per mile, and 3.7 inches per mile.

Transects were completed to determine the kinds and percentages of soils in the map units. A transect is a series of profiles examined across a map unit, commonly in a straight line, with a specified interval between each hole. The intervals between holes depended upon the detail of mapping, the complexity of the soil pattern, and the size of the delineation. In some of the smaller areas of rangeland and irrigated units, the intervals were 100 feet, whereas in some of the larger areas of rangeland, they were 1,000 to 1,500 feet. Four-wheel-drive vehicles were used during mapping where feasible. Otherwise, access to an area was obtained by walking.

The soils in the survey area were examined with the aid of shovels, crowbars, and hand augers to a depth of 5 feet or to bedrock if the depth to bedrock was less than 5 feet. A truck-mounted soil sampler also was used where texture and moisture conditions permitted.

After the completion of field mapping, map unit delineations were transferred by hand to orthophotographic mylar sheets at a scale of 1:24,000. From there, the delineations were transferred to atlas sheets for publication.

# General Soil Map Units

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The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or for a building or some other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general map units in this survey have been grouped for broad interpretive purposes. Each of the broad groups and the map units in each group are described on the following pages.

## Map Unit Descriptions

### Cold, Subhumid Soils in Mountainous Areas

#### 1. Rock Outcrop-Starman-Woosley

*Rock outcrop and nearly level to steep, very shallow to moderately deep, well drained soils that are loamy and very gravelly or are loamy; on hills, ridges, and mountains*

This unit is in the mountainous areas in the northern part of the survey area. It is characterized by nearly level to steep soils that are on mountains, hills, and ridges and are intermingled with a large amount of Rock outcrop. Slopes are 2 to 40 percent. The native vegetation is mainly grasses and shrubs and some scattered trees. Elevation is 6,800 to 9,000 feet. The annual precipitation is about 15 to 19 inches, the average annual air temperature is 33 to 41 degrees F,

and the frost-free period is 60 to 90 days.

This unit makes up about 2 percent of the survey area. It is about 24 percent Rock outcrop, 24 percent Starman and similar soils, 17 percent Woosley and similar soils, and 35 percent components of minor extent.

Rock outcrop occurs as exposures of limestone on the summit of hills, ridges, and mountains.

Starman soils are on hills, ridges, and mountains. They are very shallow or shallow. They formed in residuum and slope alluvium derived dominantly from limestone. They are loamy and very gravelly throughout and are underlain by hard limestone bedrock at a depth of 8 to 20 inches.

Woosley soils are on mountains. They are moderately deep. They formed in residuum and slope alluvium derived dominantly from limestone. They are loamy throughout and are underlain by hard limestone bedrock at a depth of 20 to 40 inches.

Of minor extent in this unit are Bachus, Chittum, Cloud Peak, Decross, Farlow, and Mosroc soils.

This unit is used as rangeland and wildlife habitat. It provides summer habitat for pronghorn antelope and moose, winter and year-round habitat for mule deer, winter and critical winter habitat for elk, and year-round and critical winter habitat for bighorn sheep. It also provides habitat for such species as masked shrew, coyote, bobcat, black bear, Nuttall's cottontail rabbit, and birds commonly associated with shrub steppes and prairies.

The main limitations in the areas used as rangeland are the slope, a short growing season, and the rooting depth, droughtiness, and content of rock fragments in the Starman soils.

#### 2. Fornor-Decross

*Nearly level to steep, very deep, well drained soils that are loamy and very cobbly or are loamy; on glacial moraines, fan aprons, and toe slopes*

This unit is in the western part of the survey area, near Dubois. It is characterized by nearly level to steep soils that are on glacial moraines and are intermingled with small areas of nearly level to moderately steep

soils on fan aprons and toe slopes. Slopes are 1 to 30 percent. The native vegetation is mainly grasses and shrubs. Elevation is 6,800 to 8,400 feet. The annual precipitation is about 15 to 19 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit makes up about 1 percent of the survey area. It is about 40 percent Fornor and similar soils, 30 percent Decross and similar soils, and 30 percent components of minor extent.

Fornor soils are on glacial moraines. They formed in glacial drift. The surface layer is loamy and very cobbly. The subsoil is loamy and very gravelly. It is underlain by loamy and very gravelly material, which extends to a depth of 60 inches or more.

Decross soils are on toe slopes and fan aprons. They formed in alluvium derived from mixed sources. They are loamy throughout.

Of minor extent in this unit are Inchau, Rockinchair, Roxal, Tongue River, and Venapass soils and Rock outcrop.

This unit is used as rangeland and wildlife habitat. It provides summer habitat for pronghorn antelope and mule deer, winter habitat for elk, and winter and year-round habitat for moose. It also provides habitat for such species as masked shrew, yellow-bellied marmot, Uinta ground squirrel, coyote, red fox, long-tailed weasel, bobcat, Nuttall's cottontail rabbit, and birds commonly associated with shrub steppes.

The main limitations in the areas used as rangeland are a short growing season and the content of rock fragments in the Fornor soils.

### **3. Owen Creek-Tongue River-Burnette**

*Nearly level to moderately steep, moderately deep and very deep, well drained soils that are loamy and very stony or are loamy; on mountain slopes, fan aprons, hills, and terraces*

This unit is in the Dubois area. It is characterized by nearly level to moderately steep soils on mountains, hills, terraces, and fan aprons. Slopes are 2 to 30 percent. The native vegetation is mainly that of wooded areas, but some areas are dominated by grasses and shrubs. Elevation is 7,000 to 9,000 feet. The annual precipitation is about 15 to 19 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is less than 60 days to 90 days.

This unit makes up about 1 percent of the survey area. It is about 30 percent Owen Creek and similar soils, 24 percent Tongue River and similar soils, 11 percent Burnette and similar soils, and 35 percent components of minor extent.

Owen Creek soils are on hillslopes and fan aprons.

They are moderately deep. They formed in residuum and slope alluvium derived dominantly from shale interbedded with sandstone. The surface layer is loamy and very stony. The subsoil is clayey. It is underlain by loamy material. Soft shale bedrock is at a depth of 20 to 40 inches.

Tongue River soils are on mountain slopes. They are moderately deep. They formed in residuum and slope alluvium derived dominantly from sandstone interbedded with shale. The surface layer and subsoil are loamy. The subsoil is underlain by very channery and loamy material. Soft sandstone bedrock is at a depth of 20 to 40 inches.

Burnette soils are on fan aprons and terraces. They are very deep. They formed in slope alluvium derived dominantly from shale interbedded with sandstone. The surface layer is loamy. The subsoil is clayey. It is underlain by clayey material, which extends to a depth of 60 inches or more.

Of minor extent in this unit are Decross, Farlow Variant, Fornor, Roxal, and Youga soils and Rock outcrop.

This unit is used mainly as woodland and wildlife habitat. It also is used as rangeland.

This unit provides summer habitat for pronghorn antelope, elk, and moose; winter and year-round habitat for mule deer, elk, and moose; and some areas of critical winter habitat for elk. It also provides habitat for such species as masked shrew, yellow-pine chipmunk, northern flying squirrel, western jumping mouse, porcupine, coyote, marten, long-tailed weasel, black bear, snowshoe hare, red squirrel, and birds commonly associated with conifer forests.

The main limitations in the areas used as woodland are the slope and the hazard of water erosion. The main limitations in the areas used as rangeland are a short growing season and the content of rock fragments.

### **4. Quander-Youga-Granile**

*Nearly level to steep, very deep, well drained, loamy and cobbly, loamy, or loamy and gravelly soils; on mountain slopes*

This unit is in the southeastern part of the survey area. It is characterized by moderately steep and steep soils on mountain back slopes and nearly level to moderately sloping soils on foot slopes. Slopes are 2 to 45 percent. The native vegetation is mainly that of wooded areas on the Granile soils and is grasses and shrubs on the Quander and Youga soils. Elevation is 7,500 to 9,000 feet. The annual precipitation is about 15 to 19 inches, the average annual air temperature is 33

to 41 degrees F, and the frost-free period is less than 60 days to 90 days.

This unit makes up about 3 percent of the survey area. It is about 27 percent Quander and similar soils, 20 percent Youga and similar soils, 18 percent Granile and similar soils, and 35 percent components of minor extent.

Quander soils are on mountain back slopes and foot slopes. They formed in alluvium derived from various sources. The surface layer is loamy and cobbly. It is underlain by loamy and very cobbly material, which extends to a depth of 60 inches or more.

Youga soils are on mountain foot slopes. They formed in alluvium derived from various sources. They are loamy throughout.

Granile soils are on mountain slopes. They formed in alluvium derived dominantly from granite and schist. The surface layer is loamy and gravelly. The subsoil is loamy and very gravelly. It is underlain by loamy and very gravelly material, which extends to a depth of 60 inches or more.

Of minor extent in this unit are Ansel soils, Aquic Cryofluvents, the very bouldery Brownsto soils, and Dahlquist, Onason, and Rock River soils.

This unit is used mainly as rangeland and wildlife habitat. The Granile soils also are used as woodland.

This unit provides summer, winter, and year-round habitat for mule deer; summer habitat for pronghorn antelope; and year-round, critical year-round, summer, and winter habitat for elk. It also provides habitat for such species as masked shrew, yellow-pine chipmunk, northern flying squirrel, western jumping mouse, porcupine, coyote, marten, long-tailed weasel, black bear, snowshoe hare, red squirrel, and birds commonly associated with conifer forests.

The main limitations in the areas used as rangeland are the slope, a short growing season, and the content of rock fragments in the Quander soils. The main limitations in the areas used as woodland are the slope and droughtiness in the Granile soils.

## **Warm, Arid Soils on Flood Plains, Terraces, and Hills**

### **5. Persayo-Clifsand-Emblem-Muff**

*Nearly level to steep, very shallow, shallow, moderately deep, and very deep, well drained soils that are loamy or are loamy and gravelly; on dissected fan aprons, terraces, hills, escarpments, and ridges*

This unit is in the northeastern part of the survey area. It is characterized by nearly level to moderately sloping soils that are on dissected fan aprons and terraces and are intermingled with areas of moderately steep and steep soils on hills, escarpments, and ridges. Slopes are 1 to 45 percent. The native vegetation is

mainly grasses and shrubs. Elevation is 4,800 to 6,500 feet. The annual precipitation is about 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit makes up about 3 percent of the survey area. It is about 30 percent Persayo and similar soils, 13 percent Clifsand and similar soils, 12 percent Emblem and similar soils, 10 percent Muff and similar soils, and 35 percent components of minor extent.

Persayo soils are on hills, ridges, and escarpments. They are very shallow or shallow. They formed in residuum and slope alluvium derived dominantly from shale. They are loamy throughout and are underlain by soft shale bedrock at a depth of 4 to 20 inches.

Clifsand soils are on dissected fan aprons, terraces, hills, and ridges. They are very deep. They formed in alluvium derived from various sources. The surface layer is loamy and gravelly. It is underlain by loamy and very gravelly material, which extends to a depth of 60 inches or more.

Emblem soils are on dissected fan aprons and terraces. They are very deep. They formed in alluvium derived from various sources. The surface layer and subsoil are loamy. The subsoil is underlain by sandy and very gravelly material, which extends to a depth of 60 inches or more.

Muff soils are on hillslopes. They are moderately deep. They formed in residuum and slope alluvium derived dominantly from shale interbedded with sandstone. They are loamy throughout and are underlain by soft shale bedrock at a depth of 20 to 40 inches. They are strongly affected by salts and alkali.

Of minor extent in this unit are Crago, Frisite, Rairdent, Worland, and Youngston soils and Rock outcrop.

This unit is used as rangeland and wildlife habitat. It provides winter and year-round habitat for pronghorn antelope and mule deer. It also provides habitat for such species as white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's kangaroo rat, desert cottontail rabbit, coyote, badger, and birds commonly associated with shrub steppes and prairies.

The main limitations in the areas used as rangeland are low precipitation, the slope and droughtiness in areas of the Persayo and Clifsand soils, and alkalinity in the Muff soils.

### **6. Persayo-Worland-Griffy**

*Nearly level to steep, very shallow, shallow, moderately deep, and very deep, well drained, loamy soils; on hills, ridges, escarpments, fan aprons, and terraces*

This unit is in the northeastern part of the survey area. It is characterized by moderately steep and steep

soils that are on hills, ridges, and escarpments and are intermingled with areas of nearly level to moderately sloping soils on fan aprons and terraces. Slopes are 1 to 45 percent. The native vegetation is mainly grasses and shrubs. Elevation is 5,200 to 6,500 feet. The annual precipitation is about 5 to 9 inches, the average annual air temperature is 45 to 49 degrees F, and the frost-free period is 120 to 130 days.

This unit makes up about 7 percent of the survey area. It is about 40 percent Persayo and similar soils, 16 percent Worland and similar soils, 14 percent Griffy and similar soils, and 30 percent components of minor extent.

Persayo soils are on hills, ridges, and escarpments. They are very shallow or shallow. They formed in residuum and slope alluvium derived dominantly from shale. They are loamy throughout and are underlain by soft shale bedrock at a depth of 4 to 20 inches.

Worland soils are on hills and ridges. They are moderately deep. They formed in residuum and slope alluvium derived dominantly from sandstone. They are loamy throughout and are underlain by soft sandstone bedrock at a depth of 20 to 40 inches.

Griffy soils are on fan aprons and terraces. They are very deep. They formed in alluvium derived dominantly from sandstone. The surface layer and subsoil are loamy. The substratum to a depth of 60 inches or more also is loamy.

Of minor extent in this unit are Clifsand, Cragosen, Lostwells, and Muff soils; Rock outcrop; and Badland.

This unit is used mainly as rangeland and wildlife habitat. It provides winter and year-round habitat for pronghorn antelope and mule deer. Some areas provide critical winter habitat for mule deer. The unit also provides habitat for such species as white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's kangaroo rat, desert cottontail rabbit, coyote, badger, and birds commonly associated with shrub steppes and prairies.

The main limitations in the areas used as rangeland are low precipitation, the slope, a restricted rooting depth in the Persayo soils, droughtiness in the Persayo and Worland soils, and wind erosion on the Griffy and Worland soils.

## 7. Griffy-Persayo

*Nearly level to moderately sloping, very shallow, shallow, and very deep, well drained, loamy soils; on terraces, fan aprons, hills, and ridges*

This unit is in the north-central part of the survey area. It is characterized by nearly level to moderately sloping soils on terraces, fan aprons, hills, and ridges. Slopes are 1 to 15 percent. The native vegetation is

mainly grasses and shrubs. Elevation is 5,200 to 6,500 feet. The annual precipitation is about 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit makes up about 9 percent of the survey area. It is about 46 percent Griffy and similar soils, 24 percent Persayo and similar soils, and 30 percent components of minor extent.

Griffy soils are on terraces and fan aprons. They are very deep. They formed in alluvium derived dominantly from sandstone. The surface layer and subsoil are loamy. The substratum to a depth of 60 inches or more also is loamy.

Persayo soils are on hills and ridges. They are very shallow or shallow. They formed in residuum and slope alluvium derived dominantly from shale. They are loamy throughout and are underlain by soft shale bedrock at a depth of 4 to 20 inches.

Of minor extent in this unit are Effington, Uffens, Worland, Mudray, and Youngston soils and Rock outcrop.

This unit is used mainly as rangeland. It also is used as wildlife habitat.

This unit provides winter and year-round habitat for pronghorn antelope and mule deer. Some areas provide summer habitat for pronghorn antelope. The unit also provides habitat for such species as white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's kangaroo rat, desert cottontail rabbit, coyote, badger, and birds commonly associated with shrub steppes and prairies.

The main limitations in the areas used as rangeland are low precipitation, droughtiness and a restricted rooting depth in the Persayo soils, and wind erosion on the Griffy soils.

## 8. Youngston-Fluvaquents-Effington

*Nearly level and gently sloping, very deep, well drained and poorly drained, loamy and sandy soils; on flood plains, low terraces, and fan aprons and in drainageways*

This unit is in the north-central part of the survey area. It is characterized by long, narrow, intermittent drainageways and by flood plains, low terraces, and fan aprons. Slopes are 0 to 6 percent. The native vegetation is mainly grasses, sedges, and shrubs. Elevation is 4,800 to 6,300 feet. The annual precipitation is about 5 to 9 inches, the average annual air temperature is 45 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit makes up about 2 percent of the survey area. It is about 39 percent Youngston and similar soils, 16 percent Fluvaquents and similar soils, 10 percent

Effington and similar soils, and 35 percent components of minor extent.

Youngston soils are on low terraces, on fan aprons, and in drainageways. They are well drained. They formed in alluvium derived from various sources. They are loamy throughout.

Fluvaquents are on flood plains. They are poorly drained. They formed in alluvium derived from various sources. They have sandy or loamy strata throughout. They have a seasonal high water table and are occasionally flooded.

Effington soils are in drainageways. They are well drained. They formed in alluvium derived dominantly from sodic shale. The surface layer is loamy. The subsoil is clayey or loamy. The soils are strongly affected by salts and alkali.

Of minor extent in this unit are Apron, Frisite, Persayo, Uffens, and Worland soils.

This unit is used mainly as rangeland. It also is used as wildlife habitat.

This unit provides winter, summer, and year-round habitat for pronghorn antelope. Some areas provide critical winter habitat for mule deer. The unit also provides habitat for such species as Merriam's shrew, water shrew, muskrat, beaver, raccoon, mink, white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's kangaroo rat, desert cottontail rabbit, Nuttall's cottontail rabbit, coyote, red fox, badger, and birds commonly associated with shrub steppes, prairies, hay fields, areas of wetland shrubs and trees, and areas of water.

The main limitations in the areas used as rangeland are low precipitation, flooding on the Fluvaquents, and alkalinity in the Effington soils.

### **Warm and Cool, Semiarid Soils on Dunes and Fan Aprons**

#### **9. Hiland-Vonalee-Orpha**

*Nearly level to steep, very deep, well drained to excessively drained, loamy and sandy soils; on fan aprons, hillslopes, and dunes*

This unit is in the northeastern part of the survey area. It is characterized by nearly level to strongly sloping soils on fan aprons and hillslopes and by steep soils on dunes. Slopes are 1 to 40 percent. The native vegetation is mainly grasses and shrubs. Elevation is 5,200 to 6,500 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 45 to 49 degrees F, and the frost-free period is 115 to 130 days.

This unit makes up about 5 percent of the survey area. It is about 49 percent Hiland and similar soils, 19 percent Vonalee and similar soils, 10 percent Orpha

and similar soils, and 22 percent components of minor extent.

Hiland soils are on fan aprons and dunes. They are well drained. They formed in eolian deposits and alluvium derived from various sources. The surface layer and subsoil are loamy. The subsoil is underlain by sandy material, which extends to a depth of 60 inches or more.

Vonalee soils are on hillslopes. They are somewhat excessively drained. They formed in eolian deposits derived from various sources. The surface layer is sandy. The subsoil is loamy. It is underlain by sandy material, which extends to a depth of 60 inches or more.

Orpha soils are on dunes. They are excessively drained. They formed in eolian sand derived from various sources. They are sandy throughout.

Of minor extent in this unit are Effington, Haverdad, Taluce, and Mudray soils; Rock outcrop; and blowouts.

This unit is used as rangeland and wildlife habitat. It provides winter and year-round habitat for pronghorn antelope and summer and year-round habitat for mule deer. It also provides habitat for such species as Merriam's shrew, white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's kangaroo rat, desert cottontail rabbit, Nuttall's cottontail rabbit, coyote, red fox, badger, and birds commonly associated with shrub steppes and prairies.

The main limitations in the areas used as rangeland are low precipitation, wind erosion, droughtiness in the Vonalee and Orpha soils, and the slope of the Orpha soils.

#### **10. Ryark-Zeomont**

*Nearly level to steep, very deep, well drained and excessively drained, loamy and sandy soils; on fan aprons and dunes*

This unit is in the south-central and southeastern parts of the survey area. It is characterized by nearly level and gently sloping soils on fan aprons and by nearly level to steep soils on dunes. Slopes are 1 to 35 percent. The native vegetation is mainly grasses and shrubs. Elevation is 6,700 to 8,000 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 80 to 110 days.

This unit makes up about 1 percent of the survey area. It is about 60 percent Ryark and similar soils, 20 percent Zeomont and similar soils, and 20 percent components of minor extent.

Ryark soils are on fan aprons. They are well drained. They formed in alluvium derived dominantly from sandstone. The surface layer and subsoil are loamy.

The subsoil is underlain by sandy material, which extends to a depth of 60 inches or more.

Zeomont soils are on dunes. They are excessively drained. They formed in sandy eolian material derived from various sources. They are sandy throughout.

Of minor extent in this unit are Bosler, Carmody, Dahlquist, Havre, and Onason soils and blowouts.

This unit is used mainly as rangeland and wildlife habitat. It provides winter and year-round habitat for pronghorn antelope. It also provides habitat for such species as white-tailed jackrabbit, desert cottontail rabbit, coyote, and birds commonly associated with prairies.

The main limitations in the areas used as rangeland are low precipitation, a short growing season, wind erosion, and droughtiness in the Zeomont soils.

## Cool, Semiarid Soils on Hills and Fan Aprons

### 11. Blackhall-Rock Outcrop-Carmody

*Rock outcrop and gently sloping to steep, very shallow to moderately deep, well drained, loamy soils; on hills, ridges, and knobs*

This unit is in the central part of the survey area. It is characterized by gently sloping to steep soils that are on hills, ridges, and knobs and are intermingled with areas of Rock outcrop. Slopes are 5 to 45 percent. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 7,500 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit makes up about 2 percent of the survey area. It is about 35 percent Blackhall and similar soils, 16 percent Rock outcrop, 14 percent Carmody and similar soils, and 35 percent components of minor extent.

Blackhall soils are on hills, ridges, and knobs. They are very shallow or shallow. They formed in residuum and slope alluvium derived dominantly from sandstone. They are loamy throughout and are underlain by soft sandstone bedrock at a depth of 6 to 20 inches.

Rock outcrop occurs as exposures of soft sandstone and shale on the side slopes and summit of hills and ridges.

Carmody soils are on hills, ridges, and knobs. They are moderately deep. They formed in residuum and slope alluvium derived dominantly from sandstone. They are loamy throughout and are underlain by soft sandstone bedrock at a depth of 20 to 40 inches.

Of minor extent in this unit are Absher, Coalmont, Cragosen, Forelle, and Havre soils.

This unit is used as rangeland and wildlife habitat. It provides winter and year-round habitat for pronghorn

antelope and mule deer. Some areas provide summer habitat for pronghorn antelope. The unit also provides habitat for such species as Merriam's shrew, white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's kangaroo rat, desert cottontail rabbit, Nuttall's cottontail rabbit, coyote, red fox, badger, and birds commonly associated with shrub steppes and prairies.

The main limitations in the areas used as rangeland are low precipitation, wind erosion, the slope, a short growing season, and droughtiness and a restricted rooting depth in the Blackhall soils.

### 12. Forelle-Poposhia-Blazon

*Nearly level to steep, very shallow, shallow, and very deep, well drained, loamy soils; on terraces, fan aprons, hills, ridges, and toe slopes*

This unit is in the central and southern parts of the survey area. It is characterized by nearly level to moderately steep soils that are on terraces, fan aprons, and toe slopes and are intermingled with areas of moderately steep and steep soils on hills and ridges. Slopes are 1 to 40 percent. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 7,500 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 80 to 110 days.

This unit makes up about 10 percent of the survey area. It is about 32 percent Forelle and similar soils, 21 percent Poposhia and similar soils, 17 percent Blazon and similar soils, and 30 percent components of minor extent.

Forelle soils are on terraces, fan aprons, and toe slopes. They are very deep. They formed in alluvium derived from various sources. They are loamy throughout.

Poposhia soils are on fan aprons and toe slopes. They are very deep. They formed in alluvium derived from various sources. They are loamy throughout.

Blazon soils are on hills and ridges. They are very shallow or shallow. They formed in residuum and slope alluvium derived dominantly from shale. They are loamy throughout and are underlain by soft shale bedrock at a depth of 4 to 20 inches.

Of minor extent in this unit are Absher, Carmody, Cragosen, and Havre soils and Rock outcrop.

This unit is used as rangeland and wildlife habitat. It provides summer, winter, and year-round habitat for pronghorn antelope. Some areas provide critical winter and critical year-round habitat for mule deer. The unit also provides habitat for such species as Merriam's shrew, white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's kangaroo rat, desert cottontail rabbit,

Nuttall's cottontail rabbit, coyote, red fox, badger, and birds commonly associated with shrub steppes and prairies.

The main limitations in the areas used as rangeland are low precipitation, a short growing season, and the slope, rooting depth, and droughtiness in areas of the Blazon soils.

### 13. Almy-Ralod-Blazon-Rock Outcrop

*Rock outcrop and nearly level to steep, very shallow, shallow, and very deep, well drained, loamy soils; on hills, ridges, and fan aprons*

This unit is in the central part of the survey area. It is characterized by moderately steep and steep soils that are on hills and ridges and are intermingled with areas of nearly level and gently sloping soils on fan aprons and with areas of Rock outcrop. Slopes are 1 to 40 percent. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 7,000 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit makes up about 4 percent of the survey area. It is about 23 percent Almy and similar soils, 19 percent Ralod and similar soils, 12 percent Blazon and similar soils, 11 percent Rock outcrop, and 35 percent components of minor extent.

Almy soils are on fan aprons. They are very deep. They formed in alluvium derived dominantly from sandstone interbedded with shale. They are loamy throughout.

Ralod soils are on hills and ridges. They are very shallow or shallow. They formed in residuum and slope alluvium derived dominantly from variegated shale. The surface layer is loamy. The subsoil is clayey. It is underlain by loamy material. Soft, variegated shale bedrock is at a depth of 9 to 20 inches. The soils are strongly affected by salts and alkali.

Blazon soils are on hills and ridges. They are very shallow or shallow. They formed in residuum and slope alluvium derived dominantly from shale. They are loamy throughout and are underlain by soft shale bedrock at a depth of 4 to 20 inches.

Rock outcrop occurs as exposures of soft, variegated shale and sandstone on hills and ridges.

Of minor extent in this unit are Absher, Carmody, Havre, Monbutte, and Poposhia soils.

This unit is used as rangeland and wildlife habitat. It provides winter and year-round habitat for pronghorn antelope and mule deer. It also provides habitat for such species as Merriam's shrew, white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's

kangaroo rat, desert cottontail rabbit, Nuttall's cottontail rabbit, coyote, red fox, badger, and birds commonly associated with shrub steppes and prairies.

The main limitations in the areas used as rangeland are low precipitation, a short growing season, alkalinity in the Ralod soils, and a restricted rooting depth in the Ralod and Blazon soils.

### 14. Rockinchair-Badland-Sinkson

*Badland and nearly level to very steep, moderately deep and very deep, well drained, loamy soils; on hills, ridges, escarpments, and fan aprons*

This unit is in the Dubois area. It is characterized by moderately steep and steep areas on hills and ridges, by very steep areas on escarpments, and by small areas of nearly level and gently sloping soils on fan aprons. Slopes are 1 to 150 percent. The native vegetation is mainly grasses and shrubs. Elevation is 6,500 to 8,000 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit makes up about 2 percent of the survey area. It is about 27 percent Rockinchair and similar soils, 21 percent Badland, 17 percent Sinkson and similar soils, and 35 percent components of minor extent.

Rockinchair soils are on hills and ridges. They are moderately deep. They formed in residuum and slope alluvium derived dominantly from variegated shale interbedded with sandstone. The surface layer is loamy. It is underlain by loamy material. Soft, variegated shale bedrock interbedded with sandstone is at a depth of 20 to 40 inches.

Badland occurs as barren areas of soft, highly erodible bedrock on hills and escarpments that are dissected by many ephemeral drainageways.

Sinkson soils are on fan aprons. They are very deep. They formed in alluvium derived dominantly from red sandstone and shale. They are loamy throughout.

Of minor extent in this unit are Absher, Forelle, Lander, and Thermopolis soils.

This unit is used as rangeland and wildlife habitat. It provides year-round habitat for pronghorn antelope, mule deer, and elk and summer habitat for pronghorn antelope and moose. Some areas provide critical winter habitat for elk. The unit also provides habitat for such species as Merriam's shrew, white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's kangaroo rat, desert cottontail rabbit, Nuttall's cottontail rabbit, coyote, red fox, badger, and birds commonly associated with shrub steppes and prairies.

The main limitations in the areas used as rangeland are low precipitation, a short growing season, and the slope of the Rockinchair soils. The Badland does not support vegetation and therefore is not suitable for grazing.

### 15. Thermopolis-Sinkson-Almy

*Nearly level to moderately steep, very shallow, shallow, and very deep, well drained, loamy soils; on hills, ridges, and fan aprons*

This unit is in the northern part of the survey area and in the vicinity of Dubois. It is characterized by moderately steep soils on hills and ridges and by nearly level to moderately sloping soils on fan aprons. Slopes are 2 to 30 percent. The native vegetation is mainly grasses and shrubs. Elevation is 5,500 to 8,000 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit makes up about 1 percent of the survey area. It is about 26 percent Thermopolis and similar soils, 22 percent Sinkson and similar soils, 17 percent Almy and similar soils, and 35 percent components of minor extent.

Thermopolis soils are on hills and ridges. They are very shallow or shallow. They formed in residuum and slope alluvium derived dominantly from sandstone and siltstone. They are loamy throughout and are underlain by soft siltstone bedrock at a depth of 6 to 20 inches.

Sinkson soils are on fan aprons. They are very deep. They formed in alluvium derived dominantly from red sandstone and siltstone. They are loamy throughout.

Almy soils are on fan aprons. They are very deep. They formed in alluvium derived dominantly from interbedded sandstone and shale. They are loamy throughout.

Of minor extent in this unit are Crago and Pensore soils and Rock outcrop. Also of minor extent, in the Dubois area, are Brownsto soils on terraces and fan aprons and the moderately well drained Lander soils on flood plains.

Most areas of this unit are used as rangeland and wildlife habitat. A few areas are used as irrigated hayland.

In the Dubois area this unit provides winter and year-round habitat for mule deer, winter habitat for elk, and summer habitat for moose. In the north-central part of the survey area, the unit provides winter and year-round habitat for pronghorn antelope. It also provides habitat for such species as water shrew, white-tailed jackrabbit, long-tailed vole, coyote, badger, and birds commonly associated with shrub steppes, prairies, and hay fields.

The main limitations in the areas used as rangeland or irrigated hayland are the slope, a short growing season, and a restricted rooting depth and droughtiness in areas of the Thermopolis soils.

### 16. Havre-Forelle-Absher

*Nearly level and gently sloping, very deep, well drained, loamy soils; on flood plains, terraces, toe slopes, and fan aprons*

This unit is in the central and southern parts of the survey area. It is characterized by nearly level and gently sloping soils on flood plains, terraces, toe slopes, and fan aprons. Slopes are 0 to 8 percent. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 7,500 feet. The annual precipitation is about 9 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 80 to 110 days.

This unit makes up about 4 percent of the survey area. It is about 25 percent Havre and similar soils, 22 percent Forelle and similar soils, 18 percent Absher and similar soils, and 35 percent components of minor extent.

Havre soils are on flood plains. They formed in alluvium derived from various sources. They are loamy throughout.

Forelle soils are on terraces, fan aprons, and toe slopes. They formed in alluvium derived from various sources. They are loamy throughout.

Absher soils are on terraces, fan aprons, and toe slopes. They formed in alluvium derived from various sources. The surface layer is loamy. The subsoil is clayey. It is underlain by loamy and clayey material, which extends to a depth of 60 inches or more. The soils are strongly affected by salts and alkali.

Of minor extent in this unit are Blazon, Carmody, Poposhia, Tisworth, and Cific soils and Badland.

This unit is used as rangeland and wildlife habitat. It provides summer, winter, and year-round habitat for pronghorn antelope and elk and year-round and critical winter habitat for mule deer. It also provides habitat for such species as Merriam's shrew, water shrew, muskrat, beaver, raccoon, mink, white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's kangaroo rat, desert cottontail rabbit, Nuttall's cottontail rabbit, coyote, red fox, badger, and birds commonly associated with shrub steppes, prairies, hay fields, areas of wetland shrubs and trees, and areas of water.

The main limitations in the areas used as rangeland are low precipitation, a short growing season, and alkalinity in the Absher soils.

## Cool, Semiarid Soils on Terraces, Flood Plains, and Hills

### 17. Rock River-Bosler-Cragosen

*Nearly level to steep, shallow and very deep, well drained, loamy and gravelly soils; on terraces, toe slopes, fan aprons, hills, and ridges*

This unit is in the central and southeastern parts of the survey area. It is characterized by nearly level and gently sloping soils that are on terraces, fan aprons, and toe slopes and are intermingled with small areas of gently sloping to steep soils on hills and ridges. Slopes are 1 to 60 percent. The native vegetation is mainly grasses and shrubs. Elevation is 5,700 to 7,800 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit makes up about 17 percent of the survey area. It is about 38 percent Rock River and similar soils, 18 percent Bosler and similar soils, 9 percent Cragosen and similar soils, and 35 percent components of minor extent.

Rock River soils are on terraces, fan aprons, and toe slopes. They are very deep. They formed in alluvium derived from various sources. They are loamy throughout.

Bosler soils are on terraces and fan aprons. They are very deep. They formed in alluvium derived from various sources. The surface layer and subsoil are loamy. The subsoil is underlain by sandy and very gravelly material, which extends to a depth of 60 inches or more.

Cragosen soils are on hills and ridges. They are shallow. They formed in residuum and slope alluvium derived dominantly from sandstone and conglomerate. The surface layer is loamy and gravelly. It is underlain by loamy and very gravelly material. Soft sandstone or conglomerate bedrock is at a depth of 10 to 20 inches.

Of minor extent in this unit are Blackhall, Carmody, Dahlquist, Havre, and Peyton soils and Rock outcrop.

This unit is used mainly as rangeland and wildlife habitat. It provides summer, winter, and year-round habitat for pronghorn antelope and mule deer. It also provides habitat for such species as Merriam's shrew, white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's kangaroo rat, desert cottontail rabbit, Nuttall's cottontail rabbit, coyote, red fox, badger, and birds commonly associated with shrub steppes and prairies.

The main limitations in the areas used as rangeland are low precipitation, a short growing season, wind erosion on the Rock River and Bosler soils, and the slope, droughtiness, rooting depth, and content of rock fragments in areas of the Cragosen soils.

### 18. Milren-Cragosen-Bosler

*Nearly level to steep, shallow and very deep, well drained soils that are loamy or are loamy and gravelly; on terraces, fan aprons, hills, and ridges*

This unit is in the central and eastern parts of the survey area. It is characterized by nearly level and gently sloping soils that are on terraces and fan aprons and are intermingled with small areas of moderately steep and steep soils on hills and ridges. Slopes are 1 to 60 percent. The native vegetation is mainly grasses and shrubs. Elevation is 6,500 to 7,800 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit makes up about 6 percent of the survey area. It is about 40 percent Milren and similar soils, 13 percent Cragosen and similar soils, 12 percent Bosler and similar soils, and 35 percent components of minor extent.

Milren soils are on terraces and fan aprons. They are very deep. They formed in alluvium derived from various sources. The surface layer is loamy. The subsoil is clayey. It is underlain by loamy material, which extends to a depth of 60 inches or more.

Cragosen soils are on hills and ridges. They are shallow. They formed in residuum and slope alluvium derived dominantly from sandstone and conglomerate. The surface layer is loamy and gravelly. It is underlain by loamy and very gravelly material. Soft sandstone or conglomerate bedrock is at a depth of 10 to 20 inches.

Bosler soils are on terraces and fan aprons. They are very deep. They formed in alluvium derived from various sources. The surface layer and subsoil are loamy. The subsoil is underlain by sandy and very gravelly material, which extends to a depth of 60 inches or more.

Of minor extent in this unit are Blazon, Carmody, Dahlquist, Havre, and Rock River soils.

This unit is used as rangeland and wildlife habitat. It provides summer habitat for pronghorn antelope and summer and year-round habitat for mule deer. Some areas provide summer, winter, and year-round habitat for elk. The unit also provides habitat for such species as Merriam's shrew, white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's kangaroo rat, desert cottontail rabbit, Nuttall's cottontail rabbit, coyote, red fox, badger, and birds commonly associated with shrub steppes and prairies.

The main limitations in the areas used as rangeland are low precipitation, a short growing season, wind erosion on the Milren and Bosler soils, and the slope, rooting depth, droughtiness, and content of rock fragments in areas of the Cragosen soils.

### 19. Countryman-Tisworth-Iceslew-Absher

*Nearly level and gently sloping, very deep, well drained to somewhat poorly drained, loamy soils; on flood plains, terraces, fan aprons, and toe slopes*

This unit is in the Dubois area and in the southern part of the survey area. It is characterized by flood plains, terraces, fan aprons, and toe slopes adjacent to the Sweetwater and DuNoir Rivers. Slopes are 1 to 8 percent. The native vegetation is mainly grasses and shrubs. Elevation is 6,500 to 8,000 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 115 days.

This unit makes up about 1 percent of the survey area. It is about 29 percent Countryman and similar soils, 17 percent Tisworth and similar soils, 11 percent Iceslew and similar soils, 8 percent Absher and similar soils, and 35 percent components of minor extent.

Countryman soils are on flood plains. They are somewhat poorly drained. They formed in alluvium derived from various sources. They are loamy throughout. A seasonal high water table fluctuates between depths of 20 and 40 inches from May through September. The soils are frequently flooded for brief periods from March through July.

Tisworth soils are on fan aprons and toe slopes. They are well drained. They formed in alluvium derived from various sources. They are loamy throughout. They are strongly affected by salts and alkali.

Iceslew soils are on flood plains and valley toe slopes. They are poorly drained. They formed in alluvium derived dominantly from sandstone and siltstone. They are loamy throughout. A seasonal high water table fluctuates between depths of 6 and 30 inches. The soils are occasionally flooded for brief periods from March through August.

Absher soils are on terraces, fan aprons, and toe slopes. They are well drained. They formed in alluvium derived from various sources. The surface layer is loamy. The subsoil is clayey. It is underlain by loamy and clayey material, which extends to a depth of 60 inches or more. The soils are strongly affected by salts and alkali.

Of minor extent in this unit are Bosler, Havre, Ryan Park, Silas, and Venapass soils. Also of minor extent are Lander and Lander Variant soils in the DuNoir Valley.

This unit is used mainly as rangeland and wildlife habitat. It also is used for irrigated hay and pasture.

In the Dubois area this unit provides summer habitat for pronghorn antelope and mule deer. Some areas provide winter and year-round habitat for moose. In the southern part of the survey area, the unit provides

winter and year-round habitat for pronghorn antelope, mule deer, and moose. The habitat for mule deer and moose is considered critical. The unit also provides habitat for such species as Merriam's shrew, water shrew, muskrat, beaver, raccoon, mink, white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's kangaroo rat, desert cottontail rabbit, Nuttall's cottontail rabbit, coyote, red fox, badger, and birds commonly associated with shrub steppes, prairies, hay fields, areas of wetland shrubs and trees, and areas of water.

The main limitations in the areas used as rangeland are low precipitation, a short growing season, wetness and flooding in areas of the Countryman and Iceslew soils, wind erosion on the Tisworth soils, and alkalinity in the Tisworth and Absher soils. The main limitations in the areas used for irrigated hay and pasture are flooding and the seasonal high water table in areas of the Countryman and Iceslew soils and alkalinity in the Tisworth and Absher soils.

### 20. Brownsto Very Bouldery-Brownsto-Decross Variant

*Nearly level to steep, very deep, well drained soils that are loamy and very bouldery or are loamy; on glacial moraines, fan aprons, and terraces and in kettles and drainageways*

This unit is in the Dubois area. It is characterized by gently sloping to steep soils on glacial moraines and by nearly level and gently sloping soils on fan aprons and terraces and in kettles and drainageways. Slopes are 1 to 50 percent. The native vegetation is mainly grasses and shrubs. Elevation is 6,000 to 7,500 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 80 to 110 days.

This unit makes up about 1 percent of the survey area. It is about 29 percent very bouldery Brownsto soils and similar soils, 25 percent other Brownsto soils and similar soils, 11 percent Decross Variant and similar soils, and 35 percent components of minor extent.

The very bouldery Brownsto soils are on glacial moraines, fan aprons, and terraces. They formed in glacial deposits derived from various sources. About 40 percent of the surface is covered with boulders, cobbles, and gravel. The surface layer is loamy and very bouldery. It is underlain by loamy and very cobbly material, which extends to a depth of 60 inches or more.

The Brownsto soils that are not bouldery are on terraces and fan aprons. They formed in alluvium derived from various sources. The surface layer and subsoil are loamy. The subsoil is underlain by loamy

and very gravelly material, which extends to a depth of 60 inches or more.

Decross Variant soils are in kettles and drainageways. They formed in alluvium derived dominantly from glacial deposits. The surface layer is loamy. It is underlain by loamy material, which extends to a depth of 60 inches or more.

Of minor extent in this unit are Almy, Lander, Lupinto, Poposhia, Rockinchair, and Sinkson soils.

This unit is used as rangeland and wildlife habitat. It provides winter and year-round habitat for pronghorn antelope, mule deer, and elk. Some areas provide summer habitat for pronghorn antelope and moose. The unit also provides habitat for such species as Merriam's shrew, water shrew, muskrat, beaver, raccoon, mink, white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's kangaroo rat, desert cottontail rabbit, Nuttall's cottontail rabbit, coyote, red fox, badger, and birds commonly associated with shrub steppes, prairies, hay fields, areas of wetland shrubs and trees, and areas of water.

The main limitations in the areas used as rangeland are low precipitation, a short growing season, and the slope; the content of rock fragments and droughtiness in areas of the Brownsto soils that are not bouldery; and the very bouldery surface layer, content of rock fragments, and droughtiness in areas of the very bouldery Brownsto soils.

## 21. Rock Outcrop-Pensore-Asholler-Pesmore

*Rock outcrop and gently sloping to steep, very shallow to moderately deep, well drained, loamy and very channery soils; on hills, ridges, and mountains*

This unit is in the northern and southeastern parts of the survey area. It is characterized by gently sloping to steep soils that are on hills, ridges, and mountains and are intermingled with a large amount of Rock outcrop. Slopes are 5 to 60 percent. The native vegetation is mainly grasses and shrubs and some scattered trees. Elevation is 6,000 to 8,000 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit makes up about 5 percent of the survey area. It is about 28 percent Rock outcrop, 14 percent Pensore and similar soils, 12 percent Asholler and similar soils, 11 percent Pesmore and similar soils, and 35 percent components of minor extent.

Rock outcrop occurs as exposures of limestone, schist, gneiss, and granite on the summit of hills, ridges, and mountains.

Pensore soils are on hills and ridges. They are shallow. They formed in residuum and slope alluvium

derived dominantly from limestone. They are loamy and very channery throughout and are underlain by hard limestone bedrock at a depth of 10 to 20 inches.

Asholler soils are on hills, ridges, and mountains. They are very shallow or shallow. They formed in residuum and slope alluvium derived dominantly from schist and granite. They are loamy and very channery throughout and are underlain by hard schist bedrock at a depth of 6 to 20 inches.

Pesmore soils are on hills, ridges, and mountains. They are moderately deep. They formed in residuum and slope alluvium derived dominantly from schist and granite. They are loamy and very channery throughout and are underlain by hard schist bedrock at a depth of 20 to 40 inches.

Of minor extent in this unit are Bosler, Carmody, Crago, Cragosen, and Cushool soils.

This unit is used as rangeland and wildlife habitat. In the Dubois area, it provides winter habitat for elk, winter and year-round habitat for mule deer, and summer habitat for moose. In the north-central part of the survey area, it provides winter, summer, and year-round habitat for mule deer and pronghorn antelope. Some areas provide critical winter habitat for mule deer. The unit also provides habitat for such species as Merriam's shrew, white-tailed jackrabbit, yellow-bellied marmot, thirteen-lined ground squirrel, white-tailed prairie dog, coyote, red fox, badger, desert cottontail rabbit, and birds commonly associated with shrub steppes and prairies.

The main limitations in the areas used as rangeland are the slope, a short growing season, the content of rock fragments, droughtiness, low precipitation, and a restricted rooting depth in the Asholler soils.

## Cold, Semiarid Soils on Hills, Pediments, and Terraces

### 22. Irigul-Gelkie-Hoodle-Rock Outcrop

*Rock outcrop and nearly level to steep, very shallow, shallow, and very deep, well drained, loamy and channery, loamy, or loamy and gravelly soils; on mountains, hills, ridges, pediments, and terraces*

This unit is in the southwestern part of the survey area. It is characterized by moderately steep and steep soils that are on mountains, hills, and ridges and are intermingled with areas of nearly level to moderately sloping soils on terraces and pediments and with areas of Rock outcrop. Slopes are 1 to 60 percent. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,500 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit makes up about 6 percent of the survey area. It is about 19 percent Irigul and similar soils, 17 percent Gelkie and similar soils, 15 percent Hoodle and similar soils, 14 percent Rock outcrop, and 35 percent components of minor extent.

Irigul soils are on mountains, hills, and ridges. They are very shallow or shallow. They formed in residuum and slope alluvium derived dominantly from schist and granite. The surface layer is loamy and channery. It is underlain by loamy and very channery material. Hard schist or granite bedrock is at a depth of 6 to 20 inches.

Gelkie soils are on terraces, mountain pediments, and hillslopes. They are very deep. They formed in alluvium derived dominantly from sandstone, schist, and granite. They are loamy throughout.

Hoodle soils are on pediments and terraces. They are very deep. They formed in alluvium derived dominantly from schist and granite. They are loamy and gravelly throughout.

Rock outcrop occurs as exposures of schist and granite on the summit of hills, ridges, and mountains.

Of minor extent in this unit are Abston, Ansel, Midelight, Mosroc, Uhl, and Venapass soils.

This unit is used as rangeland and wildlife habitat. It provides summer habitat for pronghorn antelope, mule deer, and elk; winter habitat for elk; and critical winter and year-round habitat for moose. It also provides habitat for such species as Merriam's shrew, white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's kangaroo rat, desert cottontail rabbit, Nuttall's cottontail rabbit, coyote, red fox, badger, and birds commonly associated with shrub steppes and prairies.

The main limitations in the areas used as rangeland are low precipitation, a short growing season, the content of rock fragments in the Irigul and Hoodle soils, and the slope and droughtiness in areas of the Irigul soils.

### 23. Gelkie-Hoodle-Uhl

*Nearly level to moderately sloping, very deep, well drained soils that are loamy and gravelly or are loamy; on pediments, hillslopes, terraces, and alluvial fans*

This unit is in the southwestern part of the survey area. It is characterized by nearly level to moderately sloping soils on pediments, hillslopes, terraces, and alluvial fans. Slopes are 1 to 15 percent. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,500 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit makes up about 5 percent of the survey area. It is about 31 percent Gelkie and similar soils, 29

percent Hoodle and similar soils, 5 percent Uhl and similar soils, and 35 percent components of minor extent.

Gelkie soils are on mountain pediments, terraces, and hillslopes. They formed in alluvium derived dominantly from sandstone, granite, and schist. They are loamy throughout.

Hoodle soils are on terraces and pediments. They formed in alluvium derived dominantly from schist and granite. The surface layer is loamy and gravelly. The subsoil and the substratum to a depth of 60 inches or more are loamy and very gravelly.

Uhl soils are on alluvial fans. They formed in alluvium derived dominantly from sandstone, schist, and granite. They are loamy throughout.

Of minor extent in this unit are Abston, Conpeak, Irigul, Midelight, and Pishkun Variant soils and Rock outcrop.

This unit is used as rangeland and wildlife habitat. It provides summer habitat for pronghorn antelope and mule deer and winter, summer, and critical calving habitat for elk. It also provides habitat for such species as Merriam's shrew, white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's kangaroo rat, desert cottontail rabbit, Nuttall's cottontail rabbit, coyote, red fox, badger, and birds commonly associated with shrub steppes and prairies.

The main limitations in the areas used as rangeland are low precipitation, a short growing season, and the content of rock fragments in the Hoodle soils.

### 24. Conpeak-Cryluha-Rock Outcrop

*Rock outcrop and nearly level to steep, very shallow to moderately deep, well drained soils that are loamy or are gravelly and loamy; on hills, ridges, escarpments, fan aprons, and pediments*

This unit is in the southwestern part of the survey area. It is characterized by moderately sloping to steep soils that are on hills, ridges, and escarpments and are intermingled with small areas of nearly level to moderately sloping soils on fan aprons and pediments and with areas of Rock outcrop. Slopes are 1 to 45 percent. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,500 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit makes up about 2 percent of the survey area. It is about 33 percent Conpeak and similar soils, 17 percent Cryluha and similar soils, 15 percent Rock outcrop, and 35 percent components of minor extent.

Conpeak soils are on hills and ridges. They are very shallow or shallow. They formed in residuum and slope

alluvium derived dominantly from semiconsolidated sandstone. They are loamy throughout and are underlain by semiconsolidated sandstone and siltstone bedrock at a depth of 8 to 20 inches.

Cryluha soils are on fan aprons, hillslopes, and pediments. They are moderately deep. They formed in residuum and slope alluvium derived dominantly from weakly consolidated sandstone. They are loamy and gravelly throughout and are underlain by weakly consolidated sandstone bedrock at a depth of 20 to 40 inches.

Rock outcrop occurs as exposures of semiconsolidated sandstone and siltstone on escarpments and on the summit of hills and ridges.

Of minor extent in this unit are Coutis, Lymanson, Hoodle, and Uhl soils.

This unit is used as rangeland and wildlife habitat. It provides summer habitat for pronghorn antelope, mule deer, and elk; winter and year-round habitat for mule deer and elk; and critical calving habitat for elk. It also provides habitat for such species as Merriam's shrew, white-tailed jackrabbit, thirteen-lined ground squirrel, Ord's kangaroo rat, desert cottontail rabbit, Nuttall's cottontail rabbit, coyote, red fox, badger, and birds commonly associated with shrub steppes and prairies.

The main limitations in the areas used as rangeland are low precipitation, a short growing season, and the slope and droughtiness in areas of the Conpeak soils.



# Detailed Soil Map Units

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The map units delineated on the detailed maps at the back of 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. This soil survey was designed primarily to facilitate rangeland management. The map units therefore are more broadly defined than if the survey had been designed for cultivated areas or other intensively managed areas. More information on each map unit is given under the heading "Use and Management of the Soils."

## Map Unit Composition

A map unit delineation on a 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 or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas 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 "included" areas that belong to other taxonomic classes.

Most included soils and miscellaneous areas 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, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are

called contrasting, or dissimilar, inclusions. 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 included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas 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 the soils and miscellaneous areas on the landscape.

The presence of included areas 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 segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans; however, if intensive use of small areas is planned, onsite 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 or of the underlying layers, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in slope, stoniness, salinity, wetness, 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, Brownsto loam, 0 to 6 percent slopes, is a phase of the Brownsto series.

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

A *complex* consists 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. Bosler-Rock River sandy loams, 1 to 8 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar in all areas. Blackhall-Carmody association, hilly, is an example.

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

Table 2 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. The "Glossary" defines many of the terms used in describing the soils or miscellaneous areas.

## Map Unit Descriptions

### 100—Absher-Elkol complex, 0 to 4 percent slopes.

This map unit is on terraces. Areas are irregular in shape and are 30 to 400 acres in size. The native vegetation is mainly alkali-tolerant grasses and shrubs. Elevation is 5,300 to 7,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 55 percent Absher loam, 1 to 4 percent slopes, and 30 percent Elkol silty clay loam, 0 to 3 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of slick spots; Forelle loam, 1 to 4 percent slopes; Glendive sandy loam, 1 to 3 percent slopes; Havre loam, 1 to 3 percent slopes; and Poposhia loam, 1 to 4 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Absher soil is very deep and well drained. It

formed in alluvium derived from various sources.

Typically, the surface layer is pale brown loam 1 inch thick. The upper 15 inches of the subsoil is brown, sodium-affected silty clay. The lower part to a depth of 60 inches or more is light yellowish brown, sodium-affected silty clay loam.

Permeability is very slow in the Absher soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Elkol soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown silty clay loam 2 inches thick. The upper 54 inches of the underlying material is brown, sodium-affected clay. The lower part to a depth of 60 inches or more is light gray very fine sandy loam.

Permeability is slow in the Elkol soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 15 to 30 percent alkali sacaton, 10 to 20 percent basin wildrye, 5 to 10 percent rhizomatous wheatgrasses, and 10 to 25 percent greasewood. As the range condition deteriorates, inland saltgrass and greasewood increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,500 pounds in favorable years to 1,200 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, a short growing season, and alkalinity. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in poor condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VI, nonirrigated. It

is in the Saline Lowland, 10- to 14-inch precipitation, High Plains Southeast range site.

**101—Absher-Poposhia-Sinkson complex, 1 to 10 percent slopes.** This map unit is on fan aprons, terraces, and toe slopes. Areas are elongated or irregular in shape and are 5 to 200 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,500 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 25 percent Absher loam, 1 to 8 percent slopes; 25 percent Poposhia loam, 1 to 10 percent slopes; and 25 percent Sinkson sandy clay loam, 1 to 10 percent slopes. The Absher soil is on fan aprons, terraces, and toe slopes, the Poposhia soil is on fan aprons and toe slopes, and the Sinkson soil is on fan aprons. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Almy loam, 1 to 10 percent slopes, adjacent to the Absher soil, and Rockinchair loam, 5 to 20 percent slopes, adjacent to the Poposhia soil. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Absher soil is very deep and well drained. It formed in slope alluvium derived from various sources. Typically, the surface layer is pale brown loam 4 inches thick. The upper 5 inches of the subsoil is yellowish brown, sodium-affected clay. The next 11 inches is yellowish brown, sodium-affected clay loam. The lower part to a depth of 60 inches or more is light brownish gray, sodium-affected clay loam.

Permeability is very slow in the Absher soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Poposhia soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown loam 4 inches thick. The subsoil is pale brown loam 10 inches thick. The upper 13 inches of the substratum is light olive brown sandy clay loam. The lower part to a depth of 60 inches or more is light brownish gray loam. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Poposhia soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Sinkson soil is very deep and well drained. It

formed in alluvium derived dominantly from sandstone and siltstone. Typically, the surface layer is reddish brown sandy clay loam 1 inch thick. The subsoil is reddish brown sandy clay loam 8 inches thick. The substratum to a depth of 60 inches or more is reddish brown loam. In some areas the surface layer is loam.

Permeability is moderate in the Sinkson soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

Most areas of this unit are used as rangeland and wildlife habitat. A few areas are used for irrigated hay and pasture.

The potential plant community on the Absher soil is mainly 20 to 40 percent gardner saltbush, 5 to 15 percent rhizomatous wheatgrasses, 5 to 15 percent bottlebrush squirreltail, and 10 to 20 percent Indian ricegrass. As the range condition deteriorates, gardner saltbush and birdfoot sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 450 pounds of air-dry vegetation per acre in normal years. Production ranges from 650 pounds in favorable years to 275 pounds in unfavorable years.

The potential plant community on the Poposhia and Sinkson soils is mainly 20 to 30 percent rhizomatous wheatgrasses, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, sedges and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, a short growing season, and alkalinity in the Absher soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

If this unit is used for irrigated hay and pasture, the

main limitations are the slope of all three soils and alkalinity in the Absher soil. The contour ditch or sprinkler irrigation method is suitable. The furrow or border irrigation method also is suitable, especially in nearly level areas. To prevent overirrigation and the leaching of plant nutrients and to control water erosion, applications of irrigation water should be adjusted to the available water capacity and rate of water intake in the soils. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces the hazard of ditch erosion. Grazing during wet periods results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, rotation grazing, weed control, and applications of fertilizer are needed to ensure the maximum quality of forage. Annual applications of nitrogen and phosphate fertilizer are needed to maintain the production of high-quality forage. Periodic mowing and clipping help to maintain a uniform plant cover and discourage selective grazing.

The Absher soil is in capability subclass VI<sub>s</sub>, nonirrigated and irrigated. It is in the Saline Upland, 10- to 14-inch precipitation, Foothills and Basins East range site. The Poposhia and Sinkson soils are in capability subclass IV<sub>e</sub>, nonirrigated and irrigated. They are in the Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site.

**102—Absher Variant-Absher complex, 0 to 6 percent slopes.** This map unit is on plateaus and terraces in the Great Divide Basin. Areas are irregular in shape and are 100 to 300 acres in size. The native vegetation is mainly alkali-tolerant shrubs and a few grasses. Elevation is 7,000 to 7,500 feet. The annual precipitation is 9 to 11 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 50 percent Absher Variant silty clay loam, 0 to 6 percent slopes, and 30 percent Absher sandy clay loam, 0 to 6 percent slopes. The Absher Variant soil is on plateaus, and the Absher soil is on terraces. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of slick spots; Blazon clay loam, 3 to 20 percent slopes; and Barrett Variant very channery very fine sandy loam, 5 to 15 percent slopes. These areas are on ridges. Also included are small areas of Poposhia loam, 1 to 6 percent slopes, and small areas of Rock outcrop. The Rock outcrop is on shale knobs on plateaus, terraces, and escarpments. The Poposhia soil is in areas of valley fill. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Absher Variant soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from shale. Typically, the surface layer is light olive brown silty clay loam 2 inches thick. The subsoil is light olive brown, sodium-affected clay 19 inches thick. The substratum is grayish brown clay 3 inches thick. Shale bedrock is at a depth of about 24 inches.

Permeability is slow in the Absher Variant soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Absher soil is very deep and well drained. It formed in slope alluvium derived from various sources. Typically, the surface layer is light brownish gray sandy clay loam 4 inches thick. The upper 9 inches of the subsoil is light olive brown, sodium-affected silty clay. The lower part to a depth of 60 inches or more is light olive brown, sodium-affected clay loam.

Permeability is very slow in the Absher soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 25 to 35 percent gardner saltbush, 10 to 25 percent bottlebrush squirreltail, 10 to 20 percent Indian ricegrass, and 5 to 10 percent western wheatgrass. As the range condition deteriorates, gardner saltbush and birdfoot sagebrush increase in abundance. As the range condition further deteriorates, pricklypear, annual grasses, and weeds invade. The potential plant community produces about 450 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 300 pounds in unfavorable years. Because this unit has been severely overgrazed, the present vegetation is dominantly gardner saltbush and birdfoot sagebrush.

The production of vegetation suitable for grazing is limited by low precipitation, alkalinity, and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in poor condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more

desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VI, nonirrigated. It is in the Saline Upland, 7- to 9-inch precipitation, Green River and Great Divide Basin range site.

**103—Abston-Diamondville complex, 1 to 12 percent slopes.** This map unit is on hillslopes. Areas are irregular in shape and are 40 to 200 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 7,500 feet. The annual precipitation is 9 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 55 percent Abston sandy loam, 1 to 12 percent slopes, and 30 percent Diamondville loam, 1 to 12 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Blazon clay loam, 3 to 12 percent slopes; Blackhall sandy loam, 5 to 12 percent slopes; and Forelle loam, 1 to 12 percent slopes. Also included are small areas of Rock River fine sandy loam, 1 to 8 percent slopes, and Ryan Park loamy fine sand, 1 to 8 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Abston soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sodic shale interbedded with sandstone. Typically, the surface layer is pale brown sandy loam 3 inches thick. The upper 3 inches of the subsoil is dark yellowish brown, sodium-affected clay loam. The next 7 inches is yellowish brown, sodium-affected sandy clay. The lower 21 inches is pale yellow and light gray sandy clay loam. Soft, sodic shale bedrock is at a depth of about 34 inches.

Permeability is slow in the Abston soil. Available water capacity is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Diamondville soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is pale brown loam 3 inches thick. The upper 9 inches of the subsoil is yellowish brown clay loam. The lower 24 inches is light olive brown loam. Soft sandstone bedrock is at a depth of about 36 inches.

Permeability is moderately slow in the Diamondville soil. Available water capacity is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of

wind erosion also is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Abston soil is mainly 15 to 25 percent western wheatgrass, 5 to 10 percent bottlebrush squirreltail, 5 to 10 percent Indian ricegrass, and 20 to 30 percent birdfoot sagebrush. As the range condition deteriorates, birdfoot sagebrush increases in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 700 pounds in favorable years to 350 pounds in unfavorable years.

The potential plant community on the Diamondville soil is mainly 30 to 40 percent western wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, a short growing season, and alkalinity in the Abston soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Abston soil is in capability subclass VI, nonirrigated. It is in the Impervious Clay, 10- to 14-inch precipitation, High Plains Southeast range site. The Diamondville soil is in capability subclass IVe, nonirrigated. It is in the Loamy, 10- to 14-inch precipitation, High Plains Southeast range site.

**104—Almy loam, 0 to 6 percent slopes.** This very deep, well drained soil is on fan aprons. It formed in alluvium derived dominantly from sandstone and shale.

Areas are irregular in shape and are 5 to 640 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 7,800 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

Included in this unit are small areas of Forelle fine sandy loam, 1 to 6 percent slopes; Lupinto loam, 1 to 6 percent slopes, on terraces; Monbutte fine sandy loam, 1 to 6 percent slopes; and Poposhia sandy clay loam, 1 to 6 percent slopes. Also included, on hillslopes, are small areas of Rockinchair loam, 1 to 15 percent slopes; Thermopolis loam, 2 to 15 percent slopes; and a soil that is very channery throughout. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Typically, the surface layer of the Almy soil is reddish brown loam 1 inch thick. The upper 16 inches of the subsoil is reddish brown sandy clay loam. The lower 10 inches is light reddish brown sandy clay loam. The substratum to a depth of 60 inches or more is reddish brown sandy clay loam.

Permeability is moderate. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

Most areas of this unit are used for irrigated hay and pasture. A few areas are used as rangeland and wildlife habitat.

This unit is well suited to hay and pasture. The main limitation is a short growing season. Applications of nitrogen and phosphate fertilizer improve the growth of forage plants. Irrigation water can be applied by the sprinkler or contour ditch method. To prevent overirrigation and the leaching of plant nutrients and to control water erosion, applications of irrigation water should be adjusted to the available water capacity and rate of water intake in the soil. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces the hazard of ditch erosion and water losses. Leveling helps to ensure a uniform application of water. Periodic mowing and clipping help to maintain a uniform plant cover and discourage selective grazing.

The potential plant community on this unit is mainly 20 to 30 percent rhizomatous wheatgrasses, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, sedges and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear, annual grasses, and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,100 pounds in

favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site. It is prime farmland in areas where it is irrigated and an adequate water supply is available.

**105—Almy-Monbutte-Rallod complex, 1 to 10 percent slopes.** This map unit is on fan aprons, hills, and strath terraces. Areas are irregular in shape and are 40 to 400 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,400 to 6,200 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 40 percent Almy loam, 2 to 6 percent slopes; 25 percent Monbutte fine sandy loam, 1 to 6 percent slopes; and 15 percent Rallod very fine sandy loam, 3 to 10 percent slopes. The Almy soil is on fan aprons, the Monbutte soil is on strath terraces, and the Rallod soil is on hills. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of slick spots; Blazon clay loam, 3 to 10 percent slopes; Seaverson loam, 6 to 10 percent slopes, adjacent to the Rallod soil; Forelle loam, 1 to 10 percent slopes; Poposhia loam, 1 to 10 percent slopes, adjacent to the Almy soil; and, adjacent to the Monbutte soil, a soil that is similar to the Almy soil but has bedrock at a depth of 20 to 40 inches. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Almy soil is very deep and well drained. It formed in alluvium derived dominantly from variegated sandstone interbedded with shale. Typically, the surface layer is pale brown loam 2 inches thick. The upper 3 inches of the subsoil is reddish brown clay loam. The next 13 inches is yellowish red clay loam. The lower 10 inches is light reddish brown sandy clay loam. The

substratum to a depth of 60 inches or more is light reddish brown and reddish brown sandy clay loam.

Permeability is moderate in the Almy soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Monbutte soil is very deep and well drained. It formed in residuum and slope alluvium derived dominantly from variegated shale. Typically, the surface layer is very pale brown fine sandy loam 4 inches thick. The upper 19 inches of the subsoil is dark reddish brown and yellowish red, sodium-affected clay. The lower part to a depth of 60 inches or more is pink and pinkish gray, sodium-affected sandy clay loam.

Permeability is slow in the Monbutte soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

The Ralod soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from variegated shale. Typically, the surface layer is pale brown very fine sandy loam 4 inches thick. The subsurface layer is brown loam 3 inches thick. The upper 7 inches of the subsoil is reddish brown and brown, sodium-affected sandy clay. The lower 4 inches is brown, sodium-affected sandy clay loam. Soft, variegated shale bedrock is at a depth of about 18 inches.

Permeability is slow in the Ralod soil. Available water capacity is low. The effective rooting depth is 9 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Almy soil is mainly 30 to 40 percent western wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, rabbitbrush and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Monbutte soil is mainly 40 to 50 percent thickspike wheatgrass, 15 to 25 percent green needlegrass, 5 to 10 percent bluebunch wheatgrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 10 percent big sagebrush. As the range condition deteriorates, rhizomatous wheatgrasses, Canby

bluegrass, and sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,000 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,300 pounds in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Ralod soil is mainly 15 to 25 percent bluebunch wheatgrass, 15 to 25 percent western wheatgrass, 5 to 10 percent mutton bluegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, threadleaf sedge and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, a short growing season, alkalinity in the Monbutte and Ralod soils, and the restricted rooting depth in the Ralod soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Almy soil is in capability subclass IVe, nonirrigated. It is in the Loamy, 10- to 14-inch precipitation, High Plains Southeast range site. The Monbutte soil is in capability subclass VIe, nonirrigated. It is in the Clayey, 10- to 14-inch precipitation, High Plains Southeast range site. The Ralod soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Loamy, 10- to 14-inch precipitation, High Plains Southeast range site.

**106—Ansel-Ansel Variant complex, steep.** This map unit is on fan aprons and hillslopes. Slopes are 5 to 45 percent. Areas are irregular in shape and are 40 to 1,000 acres in size. The native vegetation is mainly trees and an understory of scattered grasses, forbs, and shrubs. Elevation is 7,000 to 8,500 feet. The annual precipitation is 15 to 19 inches, the average annual air

temperature is 33 to 38 degrees F, and the frost-free period is 40 to 70 days.

This unit is about 40 percent Ansel sandy loam, 5 to 45 percent slopes, and 40 percent Ansel Variant loam, 5 to 45 percent slopes. The Ansel soil is on fan aprons, and the Ansel Variant soil is on hillslopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Hoodle very gravelly sandy loam, 2 to 15 percent slopes; Irigul channery loam, 3 to 30 percent slopes; and Midelight channery loam, 5 to 15 percent slopes. Also included are small areas of Gelkie fine sandy loam, 1 to 10 percent slopes, along drainageways and small areas of Rock outcrop on escarpments and on the summit of ridges and hills. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Ansel soil is very deep and well drained. It formed in alluvium derived dominantly from schist. Typically, the surface is covered with a mat of forest litter 2 inches thick. The surface layer is very pale brown sandy loam 5 inches thick. The next layer is pale brown sandy loam 5 inches thick. The upper 16 inches of the subsoil is brown clay loam. The lower 7 inches is yellowish brown gravelly sandy clay loam. The substratum to a depth of 60 inches or more is light olive brown gravelly sandy loam.

Permeability is moderate in the Ansel soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

The Ansel Variant soil is moderately deep and well drained. It formed in residuum and alluvium derived dominantly from schist. Typically, the surface is covered with a mat of forest litter 2 inches thick. The surface layer is brown loam 2 inches thick. The subsurface layer is pale brown channery sandy loam 6 inches thick. The subsoil is yellowish brown channery clay loam 14 inches thick. The substratum is brown very channery loam 8 inches thick. Hard schist bedrock is at a depth of about 30 inches.

Permeability is moderate in the Ansel Variant soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly for timber production. It also is used for wildlife habitat.

This unit is well suited to timber production. The site index for lodgepole pine ranges from 50 to 60. The main limitations affecting timber production and

harvesting are the slope and the available water capacity. Minimizing the risk of erosion is essential when timber is harvested. Properly designed road drainage systems that include carefully located culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding areas that have been cut and filled. Conventional methods of harvesting timber generally are suitable, but the surface may be compacted if heavy equipment is used during wet periods.

After the timber is harvested, carefully managed reforestation helps to control competition from undesirable understory plants. Properly preparing a well scarified seedbed facilitates regeneration. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.

Planting the trees on the contour helps to control erosion. Because the soils are sticky when wet, most planting and harvesting equipment can be used only during dry periods. Among the trees that are suitable for planting are lodgepole pine and Douglas fir.

This unit is in capability subclass VIe, nonirrigated. It is not assigned to a range site.

**107—Ansel-Rock outcrop complex, hilly.** This map unit is on fan aprons and hills. Slopes are 5 to 25 percent. Areas are irregular in shape and are 40 to 400 acres in size. The native vegetation is mainly trees and an understory of scattered grasses, forbs, and shrubs. Elevation is 8,000 to 8,600 feet. The annual precipitation is 15 to 19 inches, the average annual air temperature is 33 to 38 degrees F, and the frost-free period is 40 to 70 days.

This unit is about 60 percent Ansel sandy loam, 5 to 25 percent slopes, and 20 percent Rock outcrop. The Ansel soil is on fan aprons, and the Rock outcrop is on the summit of knobs and hills. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Hoodle gravelly loam, 2 to 15 percent slopes, on terraces; Irigul channery loam, 5 to 25 percent slopes; and Mosroc very gravelly fine sandy loam, 5 to 15 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Ansel soil is very deep and well drained. It formed in alluvium derived dominantly from schist. Typically, the surface is covered with a mat of forest litter 1 inch thick. The surface layer is pale brown sandy

loam 4 inches thick. The subsoil is yellowish brown gravelly sandy clay loam 17 inches thick. The substratum to a depth of 60 inches or more is light olive brown gravelly sandy loam.

Permeability is moderate in the Ansel soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

The Rock outcrop occurs as exposures of granite or schist.

This unit is used mainly for timber production. It also is used for wildlife habitat.

This unit is well suited to timber production. The site index for lodgepole pine ranges from 50 to 60.

Minimizing the risk of erosion is essential when timber is harvested. Properly designed road drainage systems that include carefully located culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding areas that have been cut and filled.

The Rock outcrop can interfere with felling, yarding, and other activities involving the use of equipment. After the timber is harvested, carefully managed reforestation helps to control competition from undesirable understory plants. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Planting the trees on the contour helps to control erosion. Conventional methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used during wet periods. Because the soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods. Among the trees that are suitable for planting are lodgepole pine and Douglas fir.

The Ansel soil is in capability subclass VIe, nonirrigated. The Rock outcrop is in capability class VIII, nonirrigated. This unit is not assigned to a range site.

**108—Apron-Lostwells complex, 0 to 10 percent slopes.** This map unit is on fan aprons and terraces. Areas are irregular in shape and are 40 to 150 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,800 to 5,500 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit is about 45 percent Apron sandy loam, 0 to 10 percent slopes, and 40 percent Lostwells loam, 1 to 8 percent slopes. The Apron soil is on fan aprons, and the Lostwells soil is on fan aprons and terraces. The components of this unit occur as areas so intricately

intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Youngston and Binton clay loams adjacent to the Lostwells soil. Also included, in small areas adjacent to the Apron soil, is a soil that is similar to the Apron soil but is sodic. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Apron soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown sandy loam 4 inches thick. The underlying material to a depth of 60 inches or more also is pale brown sandy loam.

Permeability is moderately rapid in the Apron soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

The Lostwells soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown loam 5 inches thick. The upper 9 inches of the underlying material is light yellowish brown sandy loam. The next 36 inches is pale brown sandy clay loam. The lower part to a depth of 60 inches or more is pale olive loam. The underlying material has a few thin strata of clay loam and loamy sand throughout.

Permeability is moderate in the Lostwells soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Apron soil is mainly 30 to 50 percent needleandthread, 15 to 25 percent Indian ricegrass, 5 to 10 percent rhizomatous wheatgrasses, and 5 to 10 percent big sagebrush. As the range condition deteriorates, blue grama, threadleaf sedge, yucca, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear, annual grasses, and weeds invade. The potential plant community produces about 400 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 225 pounds in unfavorable years.

The potential plant community on the Lostwells soil is mainly 10 to 20 percent Indian ricegrass, 20 to 40 percent rhizomatous wheatgrasses, 10 to 20 percent needleandthread, and 5 to 15 percent big sagebrush. As the range condition deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase in abundance. As the range condition further deteriorates,

pricklypear, annual grasses, and weeds invade. The potential plant community produces about 400 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 225 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and by wind erosion on the Apron soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VIe, nonirrigated. The Apron soil is in the Sandy, 5- to 9-inch precipitation, Wind River Basin range site. The Lostwells soil is in the Loamy, 5- to 9-inch precipitation, Wind River Basin range site.

**109—Apron-Wallson-Worland association, 1 to 15 percent slopes.** This map unit is on hills, ridges, and fan aprons. Areas are irregular in shape and are 60 to 400 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,200 to 6,300 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit is about 35 percent Apron loamy sand, 1 to 10 percent slopes; 30 percent Wallson sandy loam, 1 to 10 percent slopes; and 20 percent Worland loamy sand, 2 to 15 percent slopes. The Apron soil is on fan aprons, the Wallson soil is on toe slopes, and the Worland soil is on hills and ridges.

Included in this unit are small areas of Frisite fine sandy loam, 1 to 10 percent slopes, adjacent to the Apron soil; Oceanet sandy loam, 5 to 45 percent slopes, adjacent to the Worland soil; and Youngston clay loam, 1 to 6 percent slopes, adjacent to the Apron and Wallson soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Apron soil is very deep and well drained. It formed in alluvium derived from various sources.

Typically, the surface layer is pale brown loamy sand 8 inches thick. The underlying material to a depth of 60 inches or more is light yellowish brown sandy loam.

Permeability is moderately rapid in the Apron soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Wallson soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone. Typically, the surface layer is light yellowish brown sandy loam 3 inches thick. The upper part of the subsoil is yellowish brown sandy loam 19 inches thick. The lower part to a depth of 60 inches or more is pale brown and very pale brown sandy loam.

Permeability is moderately rapid in the Wallson soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

The Worland soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is light yellowish brown loamy sand 5 inches thick. The underlying material is light yellowish brown sandy loam 20 inches thick. Soft sandstone bedrock is at a depth of about 25 inches.

Permeability is moderately rapid in the Worland soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 30 to 50 percent needleandthread, 15 to 25 percent Indian ricegrass, 5 to 10 percent rhizomatous wheatgrasses, and 5 to 10 percent big sagebrush. As the range condition deteriorates, blue grama, threadleaf sedge, yucca, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear, annual grasses, and weeds invade. The potential plant community produces about 400 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 225 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and wind erosion and by droughtiness in the Worland soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical

area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VIe, nonirrigated. It is in the Sandy, 5- to 9-inch precipitation, Wind River Basin range site.

**110—Aquic Cryofluvents-Ansel complex, 1 to 10 percent slopes.** This map unit is on mountains. Areas are irregular in shape and are 200 to 600 acres in size. The native vegetation is mainly timber and an understory of grasses and forbs. Elevation is 8,500 to 9,000 feet. The annual precipitation is 18 to 22 inches, the average annual air temperature is 33 to 38 degrees F, and the frost-free period is 40 to 60 days.

This unit is about 55 percent Aquic Cryofluvents, 1 to 10 percent slopes, and 30 percent Ansel loam, 3 to 10 percent slopes. The Aquic Cryofluvents are on the summit of mountains, and the Ansel soil is on mountainsides. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Granile gravelly sandy loam, 5 to 15 percent slopes, and Youga loam, 2 to 10 percent slopes. Also included are small areas of very poorly drained soils that are similar to the Aquic Cryofluvents but have slopes of 1 to 5 percent and are ponded in spring and small areas of a somewhat poorly drained soil. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Aquic Cryofluvents are very deep and poorly drained. They formed in alluvium derived dominantly from conglomerate. They vary considerably within short distances. Typically, the surface is covered with a mat of undecomposed forest litter 2 inches thick. The surface layer is about 2 inches of dark brown gravelly sandy loam or gravelly loam. The underlying material to a depth of 60 inches or more is brown to light yellowish brown extremely gravelly sandy clay loam, very gravelly sandy clay loam, extremely gravelly sandy loam, very gravelly sandy loam, gravelly sandy clay loam, or gravelly sandy loam.

Permeability is moderate or moderately rapid in the Aquic Cryofluvents. Available water capacity is moderate or high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is

moderate or severe. The water table fluctuates between depths of 6 and 24 inches from January through December.

The Ansel soil is very deep and well drained. It formed in alluvium derived dominantly from schist. Typically, the surface is covered with a mat of forest litter 2 inches thick. The surface layer is grayish brown loam 3 inches thick. The next layer is pale brown loam 4 inches thick. The subsoil is light yellowish brown sandy clay loam 20 inches thick. The substratum to a depth of 60 inches or more is pale brown gravelly sandy clay loam.

Permeability is moderate in the Ansel soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as woodland. It also is used for wildlife habitat.

This unit is moderately well suited to timber production. The site index for lodgepole pine ranges from 55 to 60. The main limitation affecting timber production and harvesting is the wetness of the Aquic Cryofluvents. The use of equipment is limited unless drainage is improved. Minimizing the risk of erosion is essential when timber is harvested. Properly designed road drainage systems that include carefully located culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding areas that have been cut and filled.

After the timber is harvested, carefully managed reforestation helps to control competition from undesirable understory plants. Properly preparing a well scarified seedbed facilitates revegetation. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Hand planting of nursery stock commonly is necessary to establish or improve a stand.

Conventional methods of harvesting timber can be used. Because the soils are sticky when wet, most planting and harvesting equipment can be used only during dry periods.

This unit is in capability subclass VIe, nonirrigated. It is not assigned to a range site.

**111—Badland.** This map unit consists of barren land that is dissected by many intermittent drainage channels. Local relief generally ranges from 5 to 400 feet. Slopes are 5 to 150 percent. Areas are irregular in shape and are 10 to 1,000 acres in size. Elevation is 5,200 to 8,500 feet. The annual precipitation is 7 to 14 inches, the average annual air temperature is 39 to 49

degrees F, and the frost-free period is 80 to 130 days.

Runoff is very rapid, and geologic erosion is very active.

Included in this unit are small areas of Thermopolis loam, 2 to 30 percent slopes, on hills; Rockinchair fine sandy loam, 1 to 40 percent slopes, on hills; and Absher loam, 1 to 8 percent slopes, on fan aprons in the Dubois area. Also included, on hillslopes, are small areas of Birdsley sandy clay loam, 1 to 15 percent slopes, in the Shoshoni area; Blazon loam, 3 to 30 percent slopes; Seaverson clay loam, 6 to 20 percent slopes, in the Sand Draw area; and Poposhia loam, 1 to 10 percent slopes, and Tisworth fine sandy loam, 1 to 8 percent slopes, on fan aprons in the Great Divide Basin. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

This unit is used for wildlife habitat and for recreational purposes.

This unit is in capability class VIII, nonirrigated. It is not assigned to a range site.

**112—Badland-Birdsley complex, steep.** This map unit is on hills and ridges. Slopes are 0 to 20 percent. Areas are irregular in shape and are 40 to 400 acres in size. The Badland supports no vegetation. The native vegetation on the Birdsley soil is mainly grasses and shrubs. Elevation is 5,000 to 6,500 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit is about 50 percent Badland and 30 percent Birdsley sandy clay loam, 0 to 20 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Mudray sandy loam, 1 to 8 percent slopes; Oceanet sandy loam, 5 to 40 percent slopes; and Worland sandy loam, 1 to 35 percent slopes. Also included are small areas of Youngston clay loam, 1 to 6 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Badland occurs as steep, barren land that is dissected by many intermittent drainageways. Local relief generally ranges from 5 to 400 feet. Runoff is very rapid, and geologic erosion is very active.

The Birdsley soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sodic shale. Typically, the surface layer is pale olive sandy clay loam 2 inches thick. The underlying material is pale olive, sodium-affected sandy clay loam 12 inches thick. Soft, sodic shale bedrock is at a depth of about 14 inches.

Permeability is very slow in the Birdsley soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used for wildlife habitat and for recreational purposes.

The potential plant community on the Birdsley soil is mainly 20 to 40 percent birdfoot sagebrush, 10 to 20 percent bottlebrush squirreltail, 20 to 30 percent western wheatgrass, and 5 to 15 percent Indian ricegrass. As the range condition deteriorates, birdfoot sagebrush increases in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 200 pounds of air-dry vegetation per acre in normal years. Production ranges from 300 pounds in favorable years to 100 pounds in unfavorable years.

The production of vegetation suitable for grazing in areas of the Birdsley soil is limited by low precipitation, a short growing season, alkalinity, droughtiness, and the hazard of water erosion. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Badland is in capability class VIII. It is not assigned to a range site. The Birdsley soil is in capability subclass VIIe, nonirrigated. It is in the Impervious Clay, 5- to 9-inch precipitation, Wind River Basin range site.

**113—Badland-Seaverson-Blazon complex, steep.** This map unit is on hills and ridges. Slopes are 6 to 40 percent. Areas are irregular in shape and are 40 to 200 acres in size. The Badland supports no vegetation. The native vegetation on the Seaverson and Blazon soils is mainly grasses and shrubs. Elevation is 5,300 to 6,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 45 percent Badland; 20 percent Seaverson clay loam, 6 to 40 percent slopes; and 20 percent Blazon clay loam, 6 to 40 percent slopes. The Seaverson and Blazon soils are on hills and ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Blackhall

sandy loam, 6 to 40 percent slopes; Carmody fine sandy loam, 6 to 40 percent slopes; Poposhia loam, 1 to 20 percent slopes; and Ralrod loam, 6 to 20 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Badland occurs as steep, barren land that is dissected by many intermittent drainage channels. Local relief generally ranges from 5 to 400 feet. Runoff is very rapid, and geologic erosion is very active.

The Seaverson soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from variegated, sodic shale. Typically, the surface layer is reddish brown clay loam 2 inches thick. The underlying material is reddish brown, sodium-affected clay loam 8 inches thick. Soft, variegated, sodic shale bedrock is at a depth of about 10 inches.

Permeability is very slow in the Seaverson soil. Available water capacity is low. The effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Blazon soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from shale. Typically, the surface layer is light brownish gray clay loam 2 inches thick. The underlying material is light olive brown clay loam 17 inches thick. Soft shale bedrock is at a depth of about 19 inches.

Permeability is moderately slow in the Blazon soil. Available water capacity is low. The effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used for wildlife habitat and for recreational purposes.

The potential plant community on the Blazon and Seaverson soils is mainly 20 to 40 percent rhizomatous wheatgrasses, 5 to 15 percent bluebunch wheatgrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 10 percent winterfat. As the range condition deteriorates, bluegrasses and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for wildlife grazing is limited by low precipitation, a short growing season, alkalinity, droughtiness, the slope, and the hazard of water erosion. Proper grazing use and deferred grazing are needed to maintain an adequate

plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Badland is in capability class VIII, nonirrigated. It is not assigned to a range site. The Blazon and Seaverson soils are in capability subclass VIIe, nonirrigated. The Blazon soil is in the Shallow Clayey, 10- to 14-inch precipitation, High Plains Southeast range site. The Seaverson soil is in the Saline Upland, 10- to 14-inch precipitation, High Plains Southeast range site.

**114—Binton-Youngston clay loams, 0 to 3 percent slopes.** This map unit is on low terraces and fan aprons. Areas are irregular in shape and are 25 to 120 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,000 to 5,500 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit is about 45 percent Binton clay loam, 0 to 3 percent slopes, and 40 percent Youngston clay loam, 1 to 3 percent slopes. The Binton soil is on low terraces, and the Youngston soil is on fan aprons. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of seepy soils and Apron sandy loam, 0 to 3 percent slopes, adjacent to the Binton soil and small areas of Lostwells sandy clay loam, 0 to 3 percent slopes, adjacent to the Youngston soil. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Binton soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown clay loam 3 inches thick. The underlying material to a depth of 60 inches or more is light yellowish brown, sodium-affected clay loam stratified with thin lenses of very fine sandy loam, silty clay loam, silty clay, and sandy clay loam.

Permeability is slow in the Binton soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Youngston soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown clay loam 2

inches thick. The underlying material to a depth of 60 inches or more is brown clay loam stratified with lenses of loam, very fine sandy loam, and sandy clay loam.

Permeability is moderately slow in the Youngston soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. In most areas this soil is not subject to flooding. In a few areas near ephemeral drainageways, however, it is occasionally flooded.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Binton soil is mainly 15 to 25 percent alkali sacaton, 10 to 25 percent basin wildrye, 5 to 15 percent western wheatgrass, and 10 to 20 percent greasewood. As the range condition deteriorates, greasewood and inland saltgrass increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,600 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Youngston soil is mainly 25 to 45 percent rhizomatous wheatgrasses, 15 to 25 percent bottlebrush squirreltail, 5 to 10 percent Indian ricegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, blue grama, birdfoot sagebrush, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear, annual grasses, and weeds invade. The potential plant community produces about 300 pounds of air-dry vegetation per acre in normal years. Production ranges from 500 pounds in favorable years to 200 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, a slow rate of water intake, and alkalinity in the Binton soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Binton soil is in capability subclass VI<sub>1</sub>, nonirrigated. It is in the Saline Lowland, 5- to 9-inch

precipitation, Wind River Basin range site. The Youngston soil is in capability subclass VI<sub>2</sub>, nonirrigated. It is in the Clayey, 5- to 9-inch precipitation, Wind River Basin range site.

**115—Birdsley-Mudray complex, 3 to 15 percent slopes.** This map unit is on hills and ridges. Areas are irregular in shape and are 20 to 600 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,200 to 6,300 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit is about 55 percent Birdsley sandy clay loam, 3 to 15 percent slopes, and 30 percent Mudray sandy loam, 3 to 8 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Binton clay loam, 0 to 3 percent slopes; Effington sandy loam, 1 to 6 percent slopes; Oceanet sandy loam, 5 to 45 percent slopes; and Youngston clay loam, 1 to 6 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Birdsley soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sodic shale. Typically, the surface layer is light brownish gray sandy clay loam 2 inches thick. The underlying material is light olive brown, sodium-affected sandy clay loam 11 inches thick. Soft, sodic shale bedrock is at a depth of about 13 inches.

Permeability is very slow in the Birdsley soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Mudray soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sodic shale. Typically, the surface layer is pale brown sandy loam 2 inches thick. The upper 10 inches of the subsoil is yellowish brown, sodium-affected sandy clay. The next 4 inches is light yellowish brown, sodium-affected clay loam. The lower 3 inches is olive silty clay loam. Soft, sodic shale bedrock is at a depth of about 19 inches.

Permeability is very slow in the Mudray soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 20 to 40 percent birdfoot sagebrush, 10 to 20 percent bottlebrush squirreltail, 20 to 30 percent western wheatgrass, and 5 to 15 percent Indian ricegrass. As the range condition deteriorates, birdfoot sagebrush increases in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 200 pounds of air-dry vegetation per acre in normal years. Production ranges from 300 pounds in favorable years to 100 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by the restricted rooting depth, low precipitation, alkalinity, and droughtiness. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Loss of the surface layer severely decreases the potential for production of the plants suitable for grazing.

The Birdsley soil is in capability subclass VIIe, nonirrigated. The Mudray soil is in capability subclass VIIs, nonirrigated. Both soils are in the Impervious Clay, 5- to 9-inch precipitation, Wind River Basin range site.

**116—Blackhall-Rock outcrop complex, steep.** This map unit is on hills, ridges, knobs, and escarpments. Slopes are 25 to 45 percent. Areas are irregular in shape and are 10 to 300 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,300 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 60 percent Blackhall loam, 25 to 45 percent slopes, and 25 percent Rock outcrop. The Blackhall soil is on hills, ridges, and knobs, and the Rock outcrop is on escarpments. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Cragosen gravelly loam, 5 to 45 percent slopes; Coalmont loam, 5 to 20 percent slopes; and Milren loam, 1 to 8 percent slopes. Also included are small areas of Blackhall sandy loam that has slopes of 45 to 99 percent.

Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Blackhall soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is very pale brown loam 2 inches thick. The subsoil is very pale brown sandy loam 9 inches thick. Soft sandstone bedrock is at a depth of about 11 inches.

Permeability is moderate in the Blackhall soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Rock outcrop occurs as exposures of soft sandstone and siltstone.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Blackhall soil is mainly 15 to 25 percent bluebunch wheatgrass, 5 to 15 percent Indian ricegrass, 5 to 15 percent needleandthread, and 5 to 10 percent big sagebrush. As the range condition deteriorates, Sandberg bluegrass, threadleaf sedge, and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, the restricted rooting depth, droughtiness, and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Blackhall soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Sandy, 10- to 14-inch precipitation, High Plains Southeast range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site.

**117—Blackhall-Carmody association, hilly.** This map unit is on hills, ridges, and knobs. Slopes are 5 to 40 percent. Areas are irregular in shape and are 40 to 250 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,500 to 7,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 45 percent Blackhall fine sandy loam, 5 to 45 percent slopes, and 35 percent Carmody fine sandy loam, 5 to 25 percent slopes. The Blackhall soil is on hills, ridges, and knobs, and the Carmody soil is on hills.

Included in this unit are small areas of Blazon clay loam, 5 to 40 percent slopes; Diamondville loam, 5 to 15 percent slopes; Poposhia loam, 1 to 20 percent slopes; and Luhon loam, 5 to 10 percent slopes. Also included are small areas of Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Blackhall soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is brown fine sandy loam 2 inches thick. The subsoil is yellowish brown, brown, and pale brown sandy loam 15 inches thick. Soft sandstone bedrock is at a depth of about 17 inches.

Permeability is moderate in the Blackhall soil. Available water capacity is low. The effective rooting depth is 6 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

The Carmody soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is brown fine sandy loam 4 inches thick. The underlying material is pale brown and light yellowish brown very fine sandy loam 20 inches thick. Soft sandstone bedrock is at a depth of about 24 inches.

Permeability is moderate in the Carmody soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Blackhall soil is mainly 15 to 25 percent bluebunch wheatgrass, 5 to 15 percent Indian ricegrass, 5 to 15 percent needleandthread, and 5 to 10 percent big sagebrush. As the range condition deteriorates, threadleaf sedge, Sandberg bluegrass, and big sagebrush increase in abundance. As the range condition further deteriorates,

annual grasses and weeds invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Carmody soil is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, silver sagebrush, rabbitbrush, and forbs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, wind erosion, and the slope and by the restricted rooting depth and droughtiness in the Blackhall soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed on the Carmody soil if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Blackhall soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Sandy, 10- to 14-inch precipitation, High Plains Southeast range site. The Carmody soil is in capability subclass VIe, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**118—Blazon-Rock outcrop-Carmody complex, hilly.** This map unit is on hills, ridges, and escarpments. Slopes are 3 to 40 percent. Areas are irregular in shape and are 40 to 400 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 7,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 50 percent Blazon clay loam, 3 to

40 percent slopes; 20 percent Rock outcrop; and 15 percent Carmody gravelly sandy loam, 2 to 30 percent slopes. The Blazon and Carmody soils are on hills and ridges, and the Rock outcrop is on the summit of hills and ridges and on escarpments. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Blackhall fine sandy loam, 20 to 30 percent slopes, adjacent to the Carmody soil; Poposhia loam, 2 to 30 percent slopes, on toe slopes; and Ralrod very fine sandy loam, 3 to 20 percent slopes, adjacent to the Blazon soil. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Blazon soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from shale. Typically, the surface layer is light brownish gray clay loam 2 inches thick. The underlying material is light olive brown and light brownish gray clay loam 17 inches thick. Soft, sandy shale bedrock is at a depth of about 19 inches.

Permeability is moderately slow in the Blazon soil. Available water capacity is low. The effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Rock outcrop occurs as exposures of soft shale interbedded with sandstone.

The Carmody soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is brown gravelly sandy loam 5 inches thick. The underlying material is pale brown and light yellowish brown very fine sandy loam 15 inches thick. Soft sandstone bedrock is at a depth of about 20 inches.

Permeability is moderate in the Carmody soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Blazon soil is mainly 20 to 40 percent rhizomatous wheatgrasses, 5 to 15 percent bluebunch wheatgrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 10 percent winterfat. As the range condition deteriorates, bluegrass and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in

favorable years to 500 pounds in unfavorable years.

The potential plant community on the Carmody soil is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, silver sagebrush, rabbitbrush, and forbs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season and by the droughtiness and restricted rooting depth in the Blazon soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding is suitable on the Carmody soil and may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. If the plant cover is removed during seeding on the Carmody soil, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed (fig. 5).

The Blazon soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Clayey, 10- to 14-inch precipitation, High Plains Southeast range site. The Carmody soil is in capability subclass VIe, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site.

**119—Bluerim-Onason complex, hilly.** This map unit is on hills and ridges. Slopes are 3 to 30 percent. Areas are irregular in shape and are 100 to 600 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,500 to 7,600 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 55 percent Bluerim sandy loam, 3 to 15 percent slopes, and 30 percent Onason gravelly



**Figure 5.—An area of Blazon-Rock outcrop-Carmody complex, hilly, in the background and Diamondville-Forelle association, rolling, in the foreground. Properly located fences and watering facilities may be needed to prevent overgrazing of the less sloping areas.**

sandy loam, 5 to 30 percent slopes. The Bluerim soil is on the side slopes of hills and ridges, and the Onason soil is on the summit and shoulder slopes of hills and ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Abston fine sandy loam, 3 to 12 percent slopes; Blazon clay loam, 3 to 30 percent slopes; and Cragosen gravelly loam, 3 to 30 percent slopes. These areas are on the summit of hills and ridges. Also included are small areas of Ryark sandy loam, 3 to 10 percent slopes, on fan aprons and small areas of Rock outcrop on the summit of hills and ridges. Included areas make up about 15 percent of the

total acreage. The percentage varies from one area to another.

The Bluerim soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is brown sandy loam 3 inches thick. The upper 9 inches of the subsoil is light brown sandy clay loam. The lower 5 inches is light yellowish brown sandy loam. The substratum is very pale brown sandy loam 19 inches thick. Soft, noncalcareous sandstone bedrock is at a depth of about 36 inches.

Permeability is moderate in the Bluerim soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the

hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Onason soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, 30 percent of the surface is covered with gravel and cobbles. The upper 2 inches of the surface layer is brown gravelly sandy loam. The lower 4 inches is yellowish brown gravelly sandy loam. The underlying material is light yellowish brown gravelly sandy loam 11 inches thick. Soft, coarse grained sandstone bedrock is at a depth of about 17 inches.

Permeability is moderately rapid in the Onason soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Bluerim soil is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, rabbitbrush and silver sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Onason soil is mainly 15 to 25 percent bluebunch wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent Indian ricegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, threadleaf sedge, Sandberg bluegrass, and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by a short growing season and low precipitation and by droughtiness and the restricted rooting depth in the Onason soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent

excessive erosion. Range seeding, which is suitable on the Bluerim soil, may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Bluerim soil is in capability subclass VIe, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site. The Onason soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**120—Bosler-Rock River sandy loams, 1 to 8 percent slopes.** This map unit is on fan aprons and terraces. Areas are irregular in shape and are 40 to 400 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,800 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 45 percent Bosler sandy loam, 1 to 6 percent slopes, and 40 percent Rock River sandy loam, 1 to 8 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Cragosen gravelly loam, 3 to 25 percent slopes; Forelle loam, 1 to 8 percent slopes; and Cushool sandy loam, 2 to 10 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Bosler soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, about 10 percent of the surface is covered with gravel. The surface layer is yellowish brown sandy loam 3 inches thick. The upper 10 inches of the subsoil is yellowish brown sandy clay loam. The next 18 inches is brown sandy clay loam. The lower part to a depth of 60 inches or more is very pale brown very gravelly loamy sand.

Permeability is moderate in the Bosler soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Rock River soil is very deep and well drained. It formed in alluvium derived from various sources.

Typically, the surface layer is brown sandy loam 3 inches thick. The upper 10 inches of the subsoil is yellowish brown sandy clay loam. The lower 21 inches is pale brown sandy loam. The substratum to a depth of 60 inches or more is very pale brown sandy loam.

Permeability is moderate in the Rock River soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, silver sagebrush, rabbitbrush, and forbs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and wind erosion. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**121—Bosler-Ryan Park fine sandy loams, 1 to 8 percent slopes.** This map unit is on terraces and fan aprons. Areas are irregular in shape and are 5 to 400 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,300 to 6,800 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 45 percent Bosler fine sandy loam,

1 to 6 percent slopes, and 30 percent Ryan Park fine sandy loam, 1 to 8 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Carmody sandy loam, 1 to 15 percent slopes, on hillslopes and small areas of Cushool sandy loam, 2 to 15 percent slopes, and Milren loam, 1 to 8 percent slopes, adjacent to the Bosler soil. Also included are small areas of Rock River sandy loam, 1 to 8 percent slopes, adjacent to the Ryan Park soil. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Bosler soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is grayish brown fine sandy loam 6 inches thick. The upper 7 inches of the subsoil is brown sandy clay loam. The next 7 inches is brown gravelly sandy clay loam. The lower part to a depth of 60 inches or more is pale brown very gravelly loamy sand.

Permeability is moderate in the Bosler soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Ryan Park soil is very deep and well drained. It formed in alluvium and eolian deposits derived from various sources. Typically, the surface layer is brown fine sandy loam 3 inches thick. The upper 9 inches of the subsoil is brown sandy loam. The lower 10 inches is light brown loamy fine sand. The substratum to a depth of 60 inches or more is light brown loamy fine sand.

Permeability is moderately rapid in the Ryan Park soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat. A few areas, mainly those along the Sweetwater River, are used for irrigated hay and pasture.

This unit is moderately well suited to irrigated hay and pasture. The main limitations are droughtiness, a short growing season, and a limited supply of irrigation water. Grazing during wet periods results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, rotation grazing, weed control, and applications of fertilizer are needed to ensure the maximum quality of forage. Annual applications of nitrogen fertilizer are needed to maintain the production of high-quality forage. Periodic mowing and clipping

help to maintain a uniform plant cover and discourage selective grazing.

The contour ditch or sprinkler irrigation method is suitable on this unit. Sprinkler irrigation is the best suited method. This method permits an even, controlled application of water, helps to control runoff, and minimizes the risk of erosion. To prevent overirrigation and the leaching of plant nutrients and to control water erosion, applications of irrigation water should be adjusted to the available water capacity and rate of water intake in the soils. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces the hazard of ditch erosion.

The potential plant community on this unit is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, silver sagebrush, rabbitbrush, and forbs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, a short growing season, and wind erosion. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**122—Bowbac-Hiland complex, rolling.** This map unit is on hillslopes and fan aprons. Slopes are 1 to 15 percent. Areas are irregular in shape and are 40 to 150 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 6,500 feet. The annual precipitation is 10 to 14 inches, the average annual air

temperature is 45 to 49 degrees F, and the frost-free period is 115 to 130 days.

This unit is about 40 percent Bowbac fine sandy loam, 1 to 15 percent slopes, and 40 percent Hiland sandy loam, 1 to 8 percent slopes. The Bowbac soil is on hillslopes, and the Hiland soil is on fan aprons. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Taluce sandy loam, 5 to 35 percent slopes. Also included are small areas of Effington loam, 1 to 8 percent slopes, on flood plains and small areas of a soil that is similar to the Bowbac soil but has bedrock within a depth of 20 inches. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Bowbac soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone interbedded with shale. Typically, the surface layer is yellowish brown fine sandy loam 3 inches thick. The upper 12 inches of the subsoil is brown sandy clay loam. The next 5 inches is olive yellow fine sandy loam. The lower 6 inches is very pale brown fine sandy loam. Soft sandstone bedrock is at a depth of about 26 inches.

Permeability is moderate in the Bowbac soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

The Hiland soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown sandy loam 2 inches thick. The upper 14 inches of the subsoil is brown sandy clay loam. The lower 10 inches is brown sandy loam. The substratum to a depth of 60 inches or more is light gray sandy loam.

Permeability is moderate in the Hiland soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, rabbitbrush and silver sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in

normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and wind erosion and by droughtiness in the Bowbac soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**123—Brownsto loam, 0 to 6 percent slopes.** This very deep, well drained soil is on terraces and fan aprons. It formed in alluvium and glaciofluvial deposits derived from various sources. Areas are irregular in shape and are 5 to 320 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,500 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 80 to 110 days.

Included in this unit are small areas of Crago gravelly loam, 1 to 6 percent slopes; Decross Variant sandy loam, 1 to 6 percent slopes; Poposhia loam, 1 to 6 percent slopes; and Sinkson loam, 1 to 6 percent slopes. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Typically, the surface layer of the Brownsto soil is light yellowish brown loam 2 inches thick. The upper 5 inches of the subsoil is brown loam. The next 2 inches is light brown sandy clay loam. The next 18 inches is very pale brown very gravelly sandy loam. The lower part to a depth of 60 inches or more is brown very gravelly sandy loam that is weakly cemented with calcium carbonate and has discontinuous strata of gravelly sandy loam and very gravelly sand. In some areas the surface layer is gravelly or bouldery.

Permeability is moderate. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

Most areas of this unit are used as rangeland (fig. 6)

and wildlife habitat. A few areas are used for irrigated hay and pasture.

The potential plant community on this unit is mainly 20 to 35 percent bluebunch wheatgrass, 10 to 20 percent rhizomatous wheatgrasses, 5 to 15 percent needlegrasses, and 5 to 10 percent black sagebrush. As the range condition deteriorates, bluegrasses, sedges, and black sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 700 pounds in favorable years to 350 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, droughtiness, the content of rock fragments, and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

If this unit is used for irrigated hay and pasture, the main limitations are droughtiness and a short growing season. Some areas also are limited by a gravelly surface. Grazing during wet periods results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, rotation grazing, weed control, and applications of fertilizer are needed to ensure the maximum quality of forage. Annual applications of nitrogen and phosphate fertilizer are needed to maintain the production of high-quality forage. Periodic mowing and clipping help to maintain a uniform plant cover and discourage selective grazing.

The contour ditch or sprinkler irrigation method is suitable on this unit. The furrow or border method also is suitable in nearly level areas. Sprinkler irrigation is the best suited method. This method permits an even, controlled application of water, helps to control runoff, and minimizes the risk of erosion. To prevent overirrigation and the leaching of plant nutrients and to control water erosion, applications of irrigation water should be adjusted to the available water capacity and rate of water intake in the soil. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates



Figure 6.—Rangeland in an area of Brownsto loam, 0 to 6 percent slopes, on terraces. This soil is suitable for livestock grazing.

irrigation and reduces the hazard of ditch erosion.

This unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Shallow Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site.

**124—Brownsto sandy clay loam, 1 to 10 percent slopes.** This very deep, well drained soil is on fan aprons. It formed in glaciofluvial deposits derived from various sources. Areas are long and narrow and are 40

to 100 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,800 to 7,300 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 80 to 110 days.

Included in this unit are small areas of Brownsto sandy loam, 1 to 10 percent slopes; Poposhia loam, 1 to 10 percent slopes; and Sinkson loam, 1 to 10 percent slopes. Included areas make up about 10 percent of the

total acreage. The percentage varies from one area to another.

Typically, the surface layer of the Brownsto soil is pale brown sandy clay loam 6 inches thick. The upper 21 inches of the subsoil is very pale brown gravelly sandy clay loam. The lower part to a depth of 60 inches or more is very pale brown very gravelly sandy loam. In some areas the surface layer is gravelly sandy loam, and in other areas the surface is bouldery.

Permeability is moderate. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 20 to 30 percent rhizomatous wheatgrasses, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, sedges and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, a short growing season, and the content of rock fragments. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, nonirrigated. It is in the Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site.

**125—Brownsto very bouldery-Decross Variant-Brownsto complex, hilly.** This map unit is in kettles and on glacial moraines, fan aprons, and terraces. Slopes are 1 to 50 percent. Areas are irregular in shape and are 100 to 2,500 acres in size. The native vegetation is mainly grasses and shrubs and scattered

limber pine. Elevation is 6,000 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 80 to 110 days.

This unit is about 55 percent Brownsto very bouldery sandy clay loam, 1 to 50 percent slopes; 15 percent Decross Variant sandy loam, 1 to 8 percent slopes; and 15 percent Brownsto sandy loam, 1 to 10 percent slopes. The very bouldery Brownsto soil is on glacial moraines, fan aprons, and terraces, and the other Brownsto soil is on terraces and fan aprons. The Decross Variant soil is in kettles. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Rockinchair loam, 1 to 40 percent slopes, and Thermopolis loam, 2 to 30 percent slopes. These areas are on hillslopes. Also included are small areas of Poposhia loam, 1 to 10 percent slopes, adjacent to the Decross Variant soil; small areas of Rock outcrop on terrace escarpments adjacent to the Brownsto soil; and, in the Green Mountain area, small areas of Dahlquist very cobbly sandy clay loam, 2 to 25 percent slopes, adjacent to the very bouldery Brownsto soil. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The very bouldery Brownsto soil is very deep and well drained. It formed in glacial deposits derived from various sources. Typically, 10 percent of the surface is covered with boulders, 10 percent with cobbles, and 20 percent with gravel. The surface layer is dark yellowish brown very bouldery sandy clay loam 8 inches thick. The upper 16 inches of the subsoil is brown very gravelly sandy loam. The lower part to a depth of 60 inches or more is brown very cobbly sandy clay loam.

Permeability is moderate in the very bouldery Brownsto soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

The Decross Variant soil is very deep and well drained. It formed in alluvium derived dominantly from glacial deposits. Typically, the surface layer is yellowish brown sandy loam 2 inches thick. The upper 12 inches of the subsoil is yellowish brown and dark yellowish brown sandy clay loam. The lower part to a depth of 60 inches or more is light yellowish brown sandy clay loam. In some areas the surface layer is very gravelly sandy loam.

Permeability is moderate in the Decross Variant soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the

hazard of water erosion is slight. The hazard of wind erosion is severe.

Brownsto sandy loam is very deep and well drained. It formed in glacial drift derived from various sources. Typically, the surface layer is brown sandy loam 4 inches thick. The upper 9 inches of the subsoil is yellowish brown sandy clay loam. The next 9 inches is white gravelly sandy clay loam. The lower part to a depth of 60 inches or more is very pale brown very gravelly sandy clay loam.

Permeability is moderate in Brownsto sandy loam. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the very bouldery Brownsto soil is mainly 10 to 30 percent bluebunch wheatgrass, 10 to 20 percent needleandthread, 5 to 10 percent antelope bitterbrush, and 5 to 10 percent black sagebrush. As the range condition deteriorates, black sagebrush and bluegrasses increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 650 pounds of air-dry vegetation per acre in normal years. Production ranges from 900 pounds in favorable years to 400 pounds in unfavorable years.

The potential plant community on the Decross Variant soil is mainly 15 to 30 percent basin wildrye, 15 to 30 percent green needlegrass, and 10 to 20 percent needleandthread. As the range condition deteriorates, rhizomatous wheatgrasses and silver sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,400 pounds in favorable years to 1,200 pounds in unfavorable years.

The potential plant community on Brownsto sandy loam is mainly 20 to 35 percent bluebunch wheatgrass, 10 to 20 percent rhizomatous wheatgrasses, 5 to 15 percent needlegrasses, and 5 to 10 percent black sagebrush. As the range condition deteriorates, bluegrasses, sedges, and black sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 700 pounds in favorable years to 350 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season

and by droughtiness in the very bouldery Brownsto soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Because of the areas that have a very bouldery surface, mechanical methods of reseeding and brush control are very limited. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The very bouldery Brownsto soil is in capability subclass VIs, nonirrigated. It is in the Coarse Upland, 10- to 14-inch precipitation, Foothills and Basins East range site. The Decross Variant soil and Brownsto sandy loam are in capability subclass IVe, nonirrigated. The Decross Variant soil is in the Overflow, 10- to 14-inch precipitation, Foothills and Basins East range site. Brownsto sandy loam is in the Shallow Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site.

**126—Burnette loam, 3 to 10 percent slopes.** This very deep, well drained soil is on fan aprons and terraces. It formed in residuum and slope alluvium derived dominantly from shale interbedded with sandstone. Areas are irregular in shape and are 20 to 800 acres in size. The native vegetation is mainly grasses and shrubs, but areas near seeps are dominated by aspen. Elevation is 7,500 to 9,000 feet. The annual precipitation is 15 to 19 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

Included in this unit are small areas of Decross loam, 3 to 10 percent slopes; Fornor loam, 3 to 10 percent slopes, on moraines; Owen Creek very stony clay loam, 2 to 10 percent slopes; and Gelkie loam, 2 to 10 percent slopes. The Decross soil is in areas of valley fill. Also included are small areas of a soil that is similar to the Burnette soil but has slopes of 10 to 25 percent or a strongly alkaline subsoil and small areas of Haplaquolls, 0 to 3 percent slopes, on flood plains. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Typically, the surface layer of the Burnette soil is

brown loam 2 inches thick. The upper 6 inches of the subsoil is brown clay loam. The next 10 inches is dark grayish brown clay. The lower part to a depth of 60 inches or more is pale olive clay.

Permeability is slow. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 10 to 25 percent Columbia needlegrass, 10 to 25 percent Kingspike fescue, 10 to 25 percent Idaho fescue, and 5 to 10 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The map unit is in capability subclass VIe, nonirrigated. It is in the Loamy, 15- to 19-inch precipitation, Foothills and Mountains East range site.

**127—Chittum-Bachus-Rock outcrop association, hilly.** This map unit is on hills. Slopes are 2 to 25 percent. Areas are irregular in shape and are 160 to 640 acres in size. The native vegetation is mainly grasses and shrubs and a few juniper trees. Elevation is 6,800 to 8,500 feet. The annual precipitation is 15 to 19 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 35 percent Chittum loam, 5 to 25 percent slopes; 30 percent Bachus loam, 2 to 20 percent slopes; and 15 percent Rock outcrop. Areas adjacent to Natrona County have a higher percentage of the Chittum soil. The Chittum soil is on hillslopes, the Bachus soil is on dip slopes on cuestas, and the Rock

outcrop is on escarpments and the top of hills on cuestas.

Included in this unit are small areas of Decross loam, 1 to 25 percent slopes; Mosroc very gravelly fine sandy loam, 1 to 12 percent slopes; and Venapass loam, 0 to 3 percent slopes. The Decross soil is on the lower part of back slopes, the Mosroc soil is on back slopes, and the Venapass soil is in areas of valley fill at the base of the back slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Chittum soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from quartzitic sandstone. Typically, the surface layer is dark brown loam 3 inches thick. The subsoil is dark reddish brown loam 8 inches thick. Hard, quartzitic sandstone bedrock is at a depth of about 11 inches.

Permeability is moderate in the Chittum soil. Available water capacity is low. The effective rooting depth is 8 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Bachus soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from quartzitic sandstone. Typically, the surface layer is very dark brown loam 5 inches thick. The upper 8 inches of the subsoil is dark brown loam. The lower 11 inches is reddish brown clay loam. Hard, quartzitic sandstone bedrock is at a depth of about 24 inches.

Permeability is moderate in the Bachus soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Rock outcrop occurs as exposures of hard quartzitic sandstone.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Chittum soil is mainly 10 to 25 percent Columbia needlegrass, 10 to 25 percent Idaho fescue, 10 to 25 percent Kingspike fescue, and 0 to 10 percent mountainmahogany. As the range condition deteriorates, big sagebrush and black sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 850 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Bachus soil is mainly 10 to 25 percent Columbia needlegrass, 10 to 25

percent Kingspike fescue, 10 to 25 percent Idaho fescue, and 5 to 10 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by droughtiness and a short growing season and by the restricted rooting depth in the Chittum soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Chittum soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Loamy, 15- to 19-inch precipitation, Foothills and Mountains East range site. The Bachus soil is in capability subclass VIe, nonirrigated. It is in the Loamy, 15- to 19-inch precipitation, Foothills and Mountains East range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site.

**128—Cific-Hoodle complex, sloping.** This map unit is on strath terraces and pediments. Slopes are 1 to 15 percent. Areas are irregular in shape and are 75 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,100 to 8,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 55 percent Cific very gravelly sandy loam, 1 to 15 percent slopes, and 25 percent Hoodle gravelly sandy loam, 2 to 10 percent slopes. The Cific soil is on strath terraces, and the Hoodle soil is on pediments and strath terraces. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Gelkie Variant loam, 1 to 10 percent slopes, on hillslopes and small areas of Rock outcrop on escarpments. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Cific soil is moderately deep and well drained. It formed in glacial drift underlain by residuum derived dominantly from variegated shale. Typically, 40 percent of the surface is covered with gravel and cobbles. The surface layer is yellowish brown very gravelly sandy loam 2 inches thick. The upper 5 inches of the subsoil is brown gravelly fine sandy loam. The next 7 inches is reddish brown gravelly clay loam. The next 10 inches is brown gravelly loam. The lower 6 inches is olive channery loam. Soft, variegated shale bedrock is at a depth of about 30 inches.

Permeability is moderate in the Cific soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight.

The Hoodle soil is very deep and well drained. It formed in alluvium derived dominantly from granite and schist. Typically, 25 percent of the surface is covered with gravel and channery fragments. The surface layer is brown gravelly sandy loam 3 inches thick. The upper 10 inches of the subsoil is dark brown and yellowish brown very gravelly sandy clay loam. The lower 17 inches is light brownish gray very gravelly sandy loam. The substratum to a depth of 60 inches or more is light gray very gravelly sandy loam.

Permeability is moderate in the Hoodle soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 40 to 50 percent bluebunch wheatgrass, 5 to 10 percent Indian ricegrass, 5 to 10 percent needleandthread, and 5 to 10 percent perennial forbs. As the range condition deteriorates, sedges and shrubs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 450 pounds of air-dry vegetation per acre in normal years. Production ranges from 650 pounds in favorable years to 300 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, droughtiness, the content of rock fragments, and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is

removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. The rock fragments on the surface restrict reseeding through methods that involve tillage. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Cific soil is in capability subclass VIe, nonirrigated. The Hoodle soil is in capability subclass VIi, nonirrigated. Both soils are in the Gravelly, 10- to 14-inch precipitation, High Plains Southeast range site.

**129—Clifsand-Persayo complex, hilly.** This map unit is on terraces, escarpments, dissected fan aprons, ridges, and hills. Slopes are 2 to 40 percent. Areas are irregular in shape and are 50 to 450 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,800 to 6,200 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit is about 45 percent Clifsand gravelly loam, 2 to 30 percent slopes, and 30 percent Persayo loam, 10 to 40 percent slopes. The Clifsand soil is on terraces, dissected fan aprons, and the summit of hills and ridges, and the Persayo soil is on the shoulder slopes and back slopes of hills and on escarpments and ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Emblem sandy loam, 1 to 8 percent slopes, adjacent to the Clifsand soil; Oceanet sandy loam, 5 to 45 percent slopes; Saddle sandy loam, 1 to 12 percent slopes; and Worland sandy loam, 2 to 25 percent slopes, adjacent to the Persayo soil. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Clifsand soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, 50 percent of the surface is covered with gravel. The surface layer is pale brown gravelly loam 3 inches thick. The upper 4 inches of the subsoil is brown gravelly loam. The lower part to a depth of 60 inches or more is very pale brown very gravelly sandy loam.

Permeability is moderately rapid in the Clifsand soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

The Persayo soil is shallow and well drained. It formed in residuum and slope alluvium derived

dominantly from shale. Typically, the surface layer is light brownish gray loam 2 inches thick. The underlying material is light brownish gray clay loam 13 inches thick. Soft shale bedrock is at a depth of about 15 inches.

Permeability is moderately slow in the Persayo soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Clifsand soil is mainly 20 to 40 percent bluebunch wheatgrass, 10 to 20 percent needleandthread, 10 to 25 percent western wheatgrass, 0 to 10 percent Indian ricegrass, and 0 to 5 percent big sagebrush. As the range condition deteriorates, big sagebrush, blue grama, threadleaf sedge, and forbs increase in abundance. As the range condition further deteriorates, annual grasses, weeds, and pricklypear invade. The potential plant community produces about 200 pounds of air-dry vegetation per acre in normal years. Production ranges from 300 pounds in favorable years to 100 pounds in unfavorable years.

The potential plant community on the Persayo soil is mainly 20 to 30 percent rhizomatous wheatgrasses, 5 to 15 percent bottlebrush squirreltail, 5 to 15 percent Indian ricegrass, and 0 to 10 percent gardner saltbush. As the range condition deteriorates, big sagebrush and birdfoot sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 250 pounds of air-dry vegetation per acre in normal years. Production ranges from 350 pounds in favorable years to 125 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and droughtiness and by the restricted rooting depth in the Persayo soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Because of the rock fragments on the surface of the Clifsand soil, the shallowness of the Persayo soil, and the slope of both soils, broadcasting is the best seeding method. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Clifsand soil is in capability subclass VIi,

nonirrigated. It is in the Gravelly, 5- to 9-inch precipitation, Wind River Basin range site. The Persayo soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Clayey, 5- to 9-inch precipitation, Wind River Basin range site.

**130—Cloud Peak-Farlow complex, 10 to 30 percent slopes.** This map unit is on mountainsides. Areas are irregular in shape and are 40 to 320 acres in size. The native vegetation is mainly trees and an understory of scattered shrubs, grasses, and forbs. Elevation is 7,500 to 9,000 feet. The annual precipitation is 15 to 22 inches, the average annual air temperature is 33 to 38 degrees F, and the frost-free period is less than 60 days.

This unit is about 40 percent Cloud Peak gravelly loam, 10 to 30 percent slopes, and 40 percent Farlow gravelly clay loam, 10 to 30 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Decross loam, 3 to 20 percent slopes; Inchau sandy clay loam, 10 to 30 percent slopes; Starman very gravelly loam, 5 to 45 percent slopes; Woosley loam, 5 to 30 percent slopes; and Tongue River loam, 10 to 30 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Cloud Peak soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from limestone. Typically, the surface is covered with a mat of undecomposed forest litter 2 inches thick. The surface layer is brown gravelly loam 1 inch thick. The upper 5 inches of the subsoil is yellowish brown very channery clay loam. The next 9 inches is yellowish brown extremely channery clay loam. The lower 15 inches is very pale brown extremely channery loam. Hard limestone bedrock is at a depth of about 30 inches. In some areas the surface layer is very gravelly.

Permeability is moderate in the Cloud Peak soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Farlow soil is deep and well drained. It formed in residuum and slope alluvium derived dominantly from limestone. Typically, the surface is covered with a mat of undecomposed forest litter 1 inch thick. The surface layer is dark grayish brown gravelly clay loam 6 inches thick. The subsoil is brown extremely channery clay loam 49 inches thick. Hard limestone bedrock is at a depth of about 55 inches.

Permeability is moderate in the Farlow soil. Available water capacity is low. The effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used mainly as woodland. It also is used for wildlife habitat.

This unit is well suited to timber production. The site index for lodgepole pine ranges from 55 to 65. The site index for Douglas fir ranges from 60 to 70. Erosion is the main hazard affecting timber production and harvesting. Properly designed road drainage systems that include carefully located culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding areas that have been cut and filled. Conventional methods of harvesting timber can be used. The high-lead logging method is more efficient than most other methods and is less damaging to the surface.

After the timber is harvested, carefully managed reforestation helps to control competition from undesirable understory plants. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Planting the trees on the contour helps to control erosion. Because the soils are sticky when wet, most planting and harvesting equipment can be used only during dry periods.

The Cloud Peak soil is in capability subclass VIIs, nonirrigated. The Farlow soil is in capability subclass VIe, nonirrigated. The soils are not assigned to a range site.

**131—Coalmont-Milren-Cragosen complex, rolling.** This map unit is on hills, ridges, fan aprons, and terraces. Slopes are 1 to 30 percent. Areas are irregular in shape and are 40 to 300 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,300 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 40 percent Coalmont loam, 2 to 20 percent slopes; 25 percent Milren loam, 1 to 8 percent slopes; and 15 percent Cragosen gravelly loam, 5 to 30 percent slopes. The Coalmont soil is on ridges and hillslopes, the Milren soil is on fan aprons, and the Cragosen soil is on terrace escarpments and hillslopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Bosler fine sandy loam, 1 to 8 percent slopes, and Forelle loam, 1

to 20 percent slopes, adjacent to the Milren soil and small areas of Cushool sandy loam, 5 to 25 percent slopes, adjacent to the Coalmont soil. Also included, in areas adjacent to the Milren soil, is a soil that is similar to the Milren soil but is not characterized by an abrupt textural change. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Coalmont soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from shale interbedded with sandstone. Typically, the surface layer is grayish brown loam 2 inches thick. The upper 14 inches of the subsoil is olive clay. The lower 7 inches is olive clay loam. The substratum is olive clay loam 7 inches thick. Soft shale bedrock is at a depth of about 30 inches.

Permeability is slow in the Coalmont soil. Available water capacity is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Milren soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown loam 3 inches thick. The upper 15 inches of the subsoil is yellowish brown sandy clay. The next 5 inches is yellowish brown clay. The lower 7 inches is pale brown loam. The substratum to a depth of 60 inches or more is very pale brown loam.

Permeability is slow in the Milren soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Cragosen soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone and conglomerate. Typically, 30 percent of the surface is covered with gravel and cobbles. The surface layer is pale brown gravelly loam 2 inches thick. The subsoil is light yellowish brown very gravelly loam 10 inches thick. Soft sandstone bedrock is at a depth of about 12 inches.

Permeability is moderate in the Cragosen soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Coalmont and Milren soils is mainly 40 to 50 percent thickspike wheatgrass, 15 to 25 percent green needlegrass, 5 to 10 percent bluebunch wheatgrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 10 percent big

sagebrush. As the range condition deteriorates, rhizomatous wheatgrasses, Canby bluegrass, and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,000 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,300 pounds in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Cragosen soil is mainly 15 to 25 percent bluebunch wheatgrass, 15 to 25 percent western wheatgrass, 5 to 10 percent mutton bluegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, threadleaf sedge and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season and by droughtiness and the restricted rooting depth in the Cragosen soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Coalmont soil is in capability subclass VIe, nonirrigated. The Milren soil is in capability subclass IVe, nonirrigated. The Coalmont and Milren soils are in the Clayey, 10- to 14-inch precipitation, High Plains Southeast range site. The Cragosen soil is in capability subclass VIIc, nonirrigated. It is in the Shallow Loamy, 10- to 14-inch precipitation, High Plains Southeast range site.

**132—Conpeak-Rock outcrop-Cryluha complex, hilly.** This map unit is on pediments, fan aprons, ridges, and hills. Areas are irregular in shape and are 50 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,500 feet. The annual precipitation is 10 to 14 inches, the average annual air

temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 45 percent Conpeak fine sandy loam, 10 to 45 percent slopes; 25 percent Rock outcrop; and 15 percent Cryluha gravelly sandy loam, 2 to 15 percent slopes. The Conpeak soil is on ridges and hillslopes, the Rock outcrop is on the summit of ridges and hills and in narrow bands on hillslopes, and the Cryluha soil is on pediments, fan aprons, and hillslopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Coutis fine sandy loam, 2 to 20 percent slopes, and Lymanson gravelly loam, 4 to 20 percent slopes. The Coutis soil is on lee slopes and in areas of valley fill, and the Lymanson soil is on the sides slopes of hills and ridges. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Conpeak soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from semiconsolidated sandstone. Typically, 30 percent of the surface is covered with fragments of semiconsolidated sandstone and siltstone. The surface layer is pale brown fine sandy loam 2 inches thick. The subsoil is very pale brown fine sandy loam 11 inches thick. Soft sandstone bedrock is at a depth of 13 inches.

Permeability is moderate in the Conpeak soil. Available water capacity is low. The effective rooting depth is 8 to 20 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

The Rock outcrop occurs as exposures of weakly consolidated sandstone, siltstone, and limestone.

The Cryluha soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from weakly consolidated sandstone. Typically, 25 percent of the surface is covered with gravel. The surface layer is brown gravelly sandy loam 8 inches thick. The upper 19 inches of the subsoil is very pale brown gravelly loam. The lower 3 inches is very pale brown fine sandy loam. Weakly consolidated, calcareous sandstone bedrock is at a depth of about 30 inches.

Permeability is moderate in the Cryluha soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Conpeak and

Cryluha soils is mainly 15 to 25 percent bluebunch wheatgrass, 5 to 15 percent Indian ricegrass, 5 to 15 percent needleandthread, and 5 to 10 percent big sagebrush. As the range condition deteriorates, threadleaf sedge, Sandberg bluegrass, and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, droughtiness, and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Conpeak soil is in capability subclass VIIe, nonirrigated. The Cryluha soil is in capability subclass VIe, nonirrigated. Both soils are in the Shallow Sandy, 10- to 14-inch precipitation, High Plains Southeast range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site.

**133—Countryman-Absher complex, 0 to 3 percent slopes.** This map unit is on flood plains and terraces and in drainageways. Areas are irregular in shape and are 5 to 200 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,800 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the annual frost-free period is 90 to 110 days.

This unit is about 55 percent Countryman fine sandy loam, 0 to 3 percent slopes, and 30 percent Absher loam, 1 to 3 percent slopes. The Countryman soil is on flood plains and in drainageways, and the Absher soil is on terraces. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Bosler fine sandy loam, 1 to 3 percent slopes; Iceslew very fine sandy loam, 0 to 3 percent slopes; Tisworth loamy sand, 0 to 3 percent slopes; and Haplaquolls, 0 to 3 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Countryman soil is very deep and somewhat poorly drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown fine sandy loam 2 inches thick. The upper 23 inches of the underlying material is brown very fine sandy loam. The lower part to a depth of 60 inches or more is brown fine sandy loam stratified with thin lenses of loamy fine sand, loam, and clay loam.

Permeability is moderate in the Countryman soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The seasonal high water table fluctuates between depths of 1.5 and 3.5 feet during the period May through July. This soil is frequently flooded for brief periods from March through July.

The Absher soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is grayish brown loam 3 inches thick. The subsoil is grayish brown, sodium-affected silty clay 15 inches thick. The substratum to a depth of 60 inches or more is grayish brown clay loam.

Permeability is very slow in the Absher soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland and wildlife habitat. Some areas along the Sweetwater River are used for irrigated hay and pasture.

The potential plant community on the Countryman soil is mainly 50 to 60 percent alkali sacaton, 15 to 25 percent basin wildrye, 5 to 10 percent inland saltgrass, and 5 to 10 percent rubber rabbitbrush. As the range condition deteriorates, greasewood and inland saltgrass increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 3,000 pounds of air-dry vegetation per acre in normal years. Production ranges from 3,400 pounds in favorable years to 2,500 pounds in unfavorable years.

The potential plant community on the Absher soil is mainly 15 to 30 percent alkali sacaton, 10 to 20 percent basin wildrye, 5 to 10 percent rhizomatous wheatgrasses, and 10 to 25 percent greasewood. As the range condition deteriorates, greasewood and inland saltgrass increase in abundance. As the range

condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,500 pounds in favorable years to 1,200 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, salinity and alkalinity, and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion.

Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

If this unit is used for hay and pasture, the main management concerns are the hazard of flooding, salinity and alkalinity, and the seasonal high water table in the Countryman soil. The salinity of these soils limits forage production. Leaching the salts is difficult because of the high water table in the Countryman soil and the very slow permeability in the Absher soil. Salt-tolerant species should be selected for planting.

Grazing during wet periods results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, rotation grazing, weed control, and applications of fertilizer are needed to ensure the maximum quality of forage. Annual applications of nitrogen fertilizer are needed to maintain the production of high-quality forage. Periodic mowing and clipping help to maintain a uniform plant cover and discourage selective grazing.

The furrow, border, or sprinkler irrigation method is suitable on this unit. The method used generally is governed by the crop that is grown. To prevent overirrigation and the leaching of plant nutrients and to control water erosion, applications of irrigation water should be adjusted to the available water capacity and rate of water intake in the soils. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas.

The Countryman soil is in capability subclasses IVw, irrigated, and VIw, nonirrigated. It is in the Saline Subirrigated, 10- to 14-inch precipitation, High Plains Southeast range site. The Absher soil is in capability subclass VI, nonirrigated and irrigated. It is in the

Saline Lowland, 10- to 14-inch precipitation, High Plains Southeast range site.

**134—Coutis fine sandy loam, rolling.** This very deep, well drained soil is in drainageways and depressional areas among rolling hills. It formed in alluvium derived from various sources. Slopes are 2 to 15 percent. Areas are irregular in shape and are 5 to 70 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days. The soil receives additional moisture from melting snowdrifts.

Included in this unit are small areas of Conpeak fine sandy loam, 2 to 15 percent slopes, on hillslopes and ridges and Pishkun very gravelly sandy loam, 3 to 15 percent slopes, on terrace escarpments. Also included are small areas of Gelkie loam, 10 to 25 percent slopes, on the north-facing slopes south of Pacific Creek. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Typically, the surface layer of the Coutis soil is dark brown fine sandy loam 4 inches thick. The subsurface layer is dark grayish brown fine sandy loam 26 inches thick. The underlying material to a depth of 60 inches or more is dark brown fine sandy loam.

Permeability is moderately rapid. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, silver sagebrush and threadleaf sedge increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, wind erosion, and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting,

fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VIe, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**135—Crago-Pensore association, undulating.** This map unit is on fan aprons, hills, ridges, and piedmonts. Slopes are 1 to 20 percent. Areas are irregular in shape and are 40 to 320 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 7,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 60 percent Crago gravelly loam, 1 to 10 percent slopes, and 20 percent Pensore very channery sandy clay loam, 6 to 20 percent slopes. The Crago soil is on fan aprons, foot slopes, and piedmonts, and the Pensore soil is on the summit and shoulder slopes of hills and ridges.

Included in this unit are small areas of Blackhall fine sandy loam, 3 to 40 percent slopes, and Carmody fine sandy loam, 3 to 20 percent slopes. Also included are small areas of Cushool sandy loam, 1 to 8 percent slopes, on fan aprons and small areas of Rock outcrop on the summit of hills and ridges. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Crago soil is very deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, 30 percent of the surface is covered with gravel and cobbles. The surface layer is brown gravelly loam 3 inches thick. The subsoil to a depth of 60 inches or more is pale brown extremely gravelly loam.

Permeability is moderate in the Crago soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Pensore soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from limestone. Typically, 35 percent of the surface is covered with channery fragments and gravel. The surface layer is brown very channery sandy clay loam 3 inches thick. The subsoil is brown very channery

sandy clay loam 10 inches thick. Hard limestone bedrock is at a depth of about 13 inches.

Permeability is moderate in the Pensore soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 20 to 35 percent bluebunch wheatgrass, 10 to 20 percent rhizomatous wheatgrasses, 5 to 15 percent needlegrasses, and 5 to 10 percent black sagebrush. As the range condition deteriorates, bluegrasses, sedges, and black sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 700 pounds in favorable years to 350 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, a short growing season, droughtiness, and the content of rock fragments and by the restricted rooting depth in the Pensore soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Because of rock fragments on the surface, broadcasting is the best seeding method. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Crago soil is in capability subclass VI, nonirrigated. The Pensore soil is in capability subclass VII, nonirrigated. Both soils are in the Shallow Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site.

### **136—Cragosen-Carmody-Blazon complex, hilly.**

This map unit is on hills and ridges. Slopes are 6 to 40 percent. Areas are irregular in shape and are 40 to 320 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,000 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 50 percent Cragosen gravelly loam, 6 to 40 percent slopes; 20 percent Carmody gravelly

sandy loam, 6 to 40 percent slopes; and 15 percent Blazon sandy clay loam, 6 to 40 percent slopes. The Cragosen and Blazon soils are on the summit of hills and ridges, and the Carmody soil is on the back slopes of hills and ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Blackhall fine sandy loam, 6 to 40 percent slopes, and Coalmont fine sandy loam, 2 to 20 percent slopes. Also included are small areas of Bosler fine sandy loam, 1 to 8 percent slopes, and Milren sandy loam, 1 to 8 percent slopes, on fan aprons; a soil that is similar to the Cragosen soil but has bedrock at a depth of more than 20 inches; and Cragosen gravelly loam, 40 to 60 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Cragosen soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone and conglomerate. Typically, 30 percent of the surface is covered with gravel and cobbles. The surface layer is pale brown gravelly loam 2 inches thick. The upper 4 inches of the subsoil also is pale brown gravelly loam. The lower 6 inches is light gray very gravelly sandy loam. Soft sandstone bedrock is at a depth of about 12 inches.

Permeability is moderate in the Cragosen soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Carmody soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is pale brown gravelly sandy loam 1 inch thick. The upper 5 inches of the underlying material is yellowish brown sandy loam. The lower 16 inches is very pale brown fine sandy loam. Soft sandstone bedrock is at a depth of about 22 inches.

Permeability is moderate in the Carmody soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Blazon soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from shale. Typically, the surface layer is dark yellowish brown sandy clay loam 3 inches thick. The underlying material is light olive gray clay loam 12 inches thick. Soft shale bedrock is at a depth of about 15 inches. In some areas the surface layer is gravelly sandy clay loam.

Permeability is moderately slow in the Blazon soil.

Available water capacity is low. The effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Cragosen soil is mainly 15 to 25 percent bluebunch wheatgrass, 15 to 25 percent western wheatgrass, 5 to 10 percent mutton bluegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, threadleaf sedge and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Carmody soil is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, silver sagebrush and threadleaf sedge increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Blazon soil is mainly 20 to 40 percent rhizomatous wheatgrasses, 5 to 15 percent bluebunch wheatgrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 10 percent winterfat. As the range condition deteriorates, bluegrasses and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, droughtiness, and a short growing season and by the restricted rooting depth in the Cragosen and Blazon soils. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand

grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Cragosen soil is in capability subclass VIIc, nonirrigated. It is in the Shallow Loamy, 10- to 14-inch precipitation, High Plains Southeast range site. The Carmody soil is in capability subclass VIe, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site. The Blazon soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Clayey, 10- to 14-inch precipitation, High Plains Southeast range site.

**137—Cragosen-Rock outcrop-Carmody complex, hilly.** This map unit is on hills and ridges. Slopes are 3 to 60 percent. Areas are irregular in shape and are 40 to 320 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,000 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 45 percent Cragosen gravelly loam, 5 to 60 percent slopes; 25 percent Rock outcrop; and 15 percent Carmody sandy loam, 3 to 40 percent slopes. The Cragosen soil is on the summit and shoulder slopes of hills and ridges, the Rock outcrop is on the summit of hills and ridges, and the Carmody soil is on the side slopes of hills and ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Blackhall fine sandy loam, 5 to 40 percent slopes; Blazon clay loam, 3 to 40 percent slopes; and Cushool sandy loam, 2 to 25 percent slopes. Also included are small areas of Coalmont fine sandy loam, 2 to 20 percent slopes, and Bosler fine sandy loam, 1 to 8 percent slopes, on fan aprons and terraces. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Cragosen soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone and conglomerate. Typically, 40 percent of the surface is covered with gravel. The surface layer is dark yellowish brown gravelly loam 4 inches thick. The subsoil is light yellowish brown very gravelly sandy loam 15 inches thick. Soft sandstone bedrock is at a depth of about 19 inches.

Permeability is moderate in the Cragosen soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Rock outcrop occurs as exposures of soft sandstone and conglomerate.

The Carmody soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, 30 percent of the surface is covered with gravel. The surface layer is pale brown sandy loam 1 inch thick. The underlying material is pale brown and very pale brown very fine sandy loam 34 inches thick. Soft sandstone bedrock is at a depth of about 35 inches.

Permeability is moderate in the Carmody soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Cragosen soil is mainly 15 to 25 percent bluebunch wheatgrass, 15 to 25 percent western wheatgrass, 5 to 10 percent mutton bluegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, threadleaf sedge and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Carmody soil is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and silver sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, droughtiness, and a short growing season. It also is limited by the restricted rooting depth in the Cragosen soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand

grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Cragosen soil is in capability subclass VII<sub>s</sub>, nonirrigated. It is in the Shallow Loamy, 10- to 14-inch precipitation, High Plains Southeast range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site. The Carmody soil is in capability subclass VI<sub>e</sub>, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**138—Cragosen-Bosler-Cushool association, rolling.** This map unit is on hills, terraces, ridges, and fan aprons. Slopes are 3 to 30 percent. Areas are irregular in shape and are 10 to 800 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,000 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 35 percent Cragosen gravelly loam, 6 to 30 percent slopes; 30 percent Bosler sandy loam, 3 to 8 percent slopes; and 20 percent Cushool sandy loam, 3 to 25 percent slopes. The Cragosen soil is on hills and ridges, the Bosler soil is on terraces and fan aprons, and the Cushool soil is on hillslopes.

Included in this unit are small areas of Blackhall fine sandy loam, 5 to 30 percent slopes; Blazon clay loam, 5 to 30 percent slopes; and Carmody fine sandy loam, 3 to 30 percent slopes. Also included are small areas of Rock River fine sandy loam, 2 to 8 percent slopes, adjacent to the Bosler soil. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Cragosen soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone and conglomerate. Typically, about 40 percent of the surface is covered with gravel and cobbles. The surface layer is brown gravelly loam 6 inches thick. The subsoil is very pale brown very gravelly loam 4 inches thick. Soft conglomerate bedrock is at a depth of about 10 inches.

Permeability is moderate in the Cragosen soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

The Bosler soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown sandy loam 2 inches thick. The upper 13 inches of the subsoil is dark yellowish brown sandy clay loam. The next 5 inches is light gray sandy clay loam. The next 4 inches is very

pale brown loamy sand. The lower part to a depth of 60 inches or more is very pale brown very gravelly loamy sand.

Permeability is moderate in the Bosler soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Cushool soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is yellowish brown sandy loam 3 inches thick. The upper 13 inches of the subsoil is yellowish brown sandy clay loam. The next 7 inches is pale brown sandy clay loam. The lower 13 inches is light yellowish brown fine sandy loam. Soft sandstone bedrock is at a depth of about 36 inches.

Permeability is moderate in the Cushool soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Cragosen soil is mainly 15 to 25 percent bluebunch wheatgrass, 15 to 25 percent western wheatgrass, 5 to 10 percent mutton bluegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, threadleaf sedge and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Bosler and Cushool soils is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and silver sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, a short growing season, and droughtiness and by the restricted rooting depth in the Cragosen soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices

include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Cragosen soil is in capability subclass VIIs, nonirrigated. It is in the Shallow Loamy, 10- to 14-inch precipitation, High Plains Southeast range site. The Bosler and Cushool soils are in capability subclass IVe, nonirrigated. They are in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**139—Cryluha-Conpeak association, 1 to 15 percent slopes.** This map unit is on pediments, fan aprons, hills, and ridges. Areas are irregular in shape and are 75 to 400 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 55 percent Cryluha gravelly sandy loam, 1 to 7 percent slopes, and 30 percent Conpeak fine sandy loam, 2 to 15 percent slopes. The Cryluha soil is on fan aprons and hillslopes, and the Conpeak soil is on the side slopes of ridges and hills and on pediments.

Included in this unit are small areas of Coutis fine sandy loam, 2 to 15 percent slopes, on the lee slopes of hills; Lymanson gravelly loam on the side slopes of hills and ridges; and Rock outcrop on escarpments. Also included are small areas of a soil that is similar to the Cryluha soil but has sandstone bedrock below a depth of 40 inches. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Cryluha soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from weakly consolidated sandstone. Typically, 25 percent of the surface is covered with gravel. The upper 5 inches of the surface layer is brown gravelly sandy loam. The lower 8 inches is pale brown gravelly loam. The upper 6 inches of the subsoil is very pale brown gravelly fine sandy loam. The lower 8 inches is very pale brown gravelly loam. Weakly consolidated, calcareous sandstone bedrock is at a depth of about 27 inches.

Permeability is moderate in the Cryluha soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard

of water erosion is slight. The hazard of wind erosion is moderate.

The Conpeak soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from semiconsolidated sandstone. Typically, 30 percent of the surface is covered with semiconsolidated sandstone and siltstone fragments. The surface layer is light brownish gray fine sandy loam 2 inches thick. The subsoil is pale brown and light brownish gray fine sandy loam 12 inches thick. Soft, fine grained sandstone bedrock is at a depth of about 14 inches.

Permeability is moderate in the Conpeak soil. Available water capacity is low. The effective rooting depth is 8 to 20 inches. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 15 to 25 percent bluebunch wheatgrass, 15 to 25 percent needleandthread, 5 to 15 percent Indian ricegrass, and 5 to 10 percent black sagebrush. As the range condition deteriorates, Sandberg bluegrass, threadleaf sedge, and black sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, droughtiness, wind erosion, and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Cryluha soil is in capability subclass VIe, nonirrigated. The Conpeak soil is in capability subclass VIIe, nonirrigated. Both soils are in the Shallow Sandy,

10- to 14-inch precipitation, High Plains Southeast range site.

**140—Cushool-Rock River association, 1 to 15 percent slopes.** This map unit is on fan aprons, terraces, and hillslopes. Areas are irregular in shape and are 40 to 600 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,700 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 55 percent Cushool sandy loam, 3 to 15 percent slopes, and 35 percent Rock River fine sandy loam, 1 to 8 percent slopes. The Cushool soil is on hillslopes and fan aprons, and the Rock River soil is on terraces and fan aprons.

Included in this unit are small areas of Almy loam, 1 to 10 percent slopes; Bosler fine sandy loam, 1 to 8 percent slopes; Diamondville loam, 1 to 15 percent slopes; and Forelle loam, 1 to 15 percent slopes. Also included are small areas of Blackhall fine sandy loam, 8 to 25 percent slopes, and Cragosen gravelly loam, 10 to 30 percent slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Cushool soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is brown sandy loam 3 inches thick. The upper 14 inches of the subsoil is brown sandy clay loam. The next 6 inches is pale brown sandy clay loam. The lower 12 inches is very pale brown fine sandy loam. Soft sandstone bedrock is at a depth of about 35 inches. In some areas the surface layer is fine sandy loam.

Permeability is moderate in the Cushool soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

The Rock River soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown fine sandy loam 3 inches thick. The upper 15 inches of the subsoil is brown sandy clay loam. The lower 16 inches is pale brown sandy clay loam. The substratum to a depth of 60 inches or more is light brownish gray sandy clay loam. In some areas the surface layer is sandy loam.

Permeability is moderate in the Rock River soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and silver sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, wind erosion, and a short growing season and by droughtiness in the Cushool soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**141—Dahlquist-Rock River complex, 1 to 12 percent slopes.** This map unit is on fan aprons and fan piedmonts. Areas are irregular in shape and are 40 to 640 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,000 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 55 percent Dahlquist very cobbly loam, 2 to 12 percent slopes, and 25 percent Rock River sandy loam, 1 to 8 percent slopes. The Dahlquist soil is on fan aprons and fan piedmonts, and the Rock River soil is on fan aprons. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Dahlquist very cobbly loam, 12 to 25 percent slopes; in the vicinity of Shoshoni and Lysite, small areas of Bosler fine sandy loam, 1 to 8 percent slopes, Cushool fine sandy loam, 2 to 15 percent slopes, and Rock outcrop; and small areas of Blazon clay loam, 3 to 15 percent slopes, and Pesmore very channery sandy clay loam, 10 to 15

percent slopes. Also included, in the vicinity of Jeffrey City, are small areas of Bosler fine sandy loam, 1 to 8 percent slopes; Brownsto very cobbly loam, 1 to 12 percent slopes; Carmody fine sandy loam, 2 to 15 percent slopes; Milvar stony loam, 1 to 6 percent slopes; and a soil that is similar to the Dahlquist soil but is moderately deep. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Dahlquist soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, 20 percent of the surface is covered with gravel, cobbles, and stones. The surface layer is brown very cobbly loam 3 inches thick. The upper part of the subsoil is brown and yellowish brown very gravelly sandy clay loam 11 inches thick. The lower part to a depth of 60 inches or more is light yellowish brown extremely cobbly sandy loam. In some areas the surface layer is bouldery loam.

Permeability is moderate in the Dahlquist soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight. The hazard of wind erosion also is slight.

The Rock River soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is grayish brown sandy loam 4 inches thick. The upper part of the subsoil is brown sandy clay loam 17 inches thick. The lower part is pale brown sandy loam 19 inches thick. The substratum to a depth of 60 inches or more is very pale brown sandy loam. In some areas the surface layer is bouldery loam.

Permeability is moderate in the Rock River soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Dahlquist soil is mainly 10 to 20 percent bluebunch wheatgrass, 5 to 10 percent mutton bluegrass, 5 to 10 percent western wheatgrass, and 5 to 10 percent black sagebrush. As the range condition deteriorates, western wheatgrass and black sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,000 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Rock River soil is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush.

As the range condition deteriorates, big sagebrush and threadleaf sedge increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season and by droughtiness and the content of rock fragments in the Dahlquist soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. The rock fragments on the surface of the Dahlquist soil hinder seeding methods that involve tillage and mechanical methods of brush control. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Dahlquist soil is in capability subclass VI<sub>s</sub>, nonirrigated. It is in the Coarse Upland, 10- to 14-inch precipitation, High Plains Southeast range site. The Rock River soil is in capability subclass IV<sub>e</sub>, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**142—Diamondville-Forelle association, rolling.** This map unit is on hills and fan aprons. Slopes are 2 to 15 percent. Areas are irregular in shape and are 40 to 640 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 50 percent Diamondville loam, 2 to 15 percent slopes, and 30 percent Forelle loam, 2 to 15 percent slopes. The Diamondville soil is on hillslopes, and the Forelle soil is on toe slopes and fan aprons.

Included in this unit are small areas of Blackhall fine sandy loam, 5 to 45 percent slopes; Blazon clay loam, 3 to 40 percent slopes; and Carmody fine sandy loam, 2 to 40 percent slopes. Also included are small areas of Poposhia loam, 1 to 15 percent slopes; Rock River fine sandy loam, 1 to 8 percent slopes; and Cushool sandy loam, 2 to 15 percent slopes. The Blackhall, Blazon, Carmody, and Cushool soils are adjacent to the Diamondville soil, and the Poposhia and Rock River soils are adjacent to the Forelle soil. Included areas

make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Diamondville soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is pale brown loam 2 inches thick. The upper 11 inches of the subsoil is brown and light brown clay loam. The lower 11 inches is pale brown and light yellowish brown loam. Soft sandstone bedrock is at a depth of about 24 inches.

Permeability is moderately slow in the Diamondville soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Forelle soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is grayish brown loam 6 inches thick. The upper 12 inches of the subsoil is brown clay loam. The next 4 inches is pale brown clay loam. The lower 4 inches is pale brown loam. The substratum to a depth of 60 inches or more also is pale brown loam.

Permeability is moderately slow in the Forelle soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 30 to 40 percent western wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should

be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, nonirrigated. It is in the Loamy, 10- to 14-inch precipitation, High Plains Southeast range site.

**143—Effington-Mudray complex, 0 to 8 percent slopes.** This map unit is on hillslopes and in drainageways. Areas are irregular in shape and are 30 to 150 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,200 to 6,000 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit is about 55 percent Effington loam, 0 to 8 percent slopes, and 25 percent Mudray clay loam, 1 to 8 percent slopes. The Effington soil is in drainageways, and the Mudray soil is on hillslopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Persayo clay loam, 3 to 10 percent slopes, adjacent to the Mudray soil. Also included are small areas of Saddle sandy loam, 1 to 8 percent slopes, and Youngston loam, 1 to 6 percent slopes, adjacent to the Effington soil. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Effington soil is very deep and well drained. It formed in alluvium derived dominantly from sodic shale. Typically, the surface layer is very pale brown loam 2 inches thick. The upper 3 inches of the subsoil is dark brown clay loam. The next 6 inches is yellowish brown, sodium-affected sandy clay. The next 11 inches is pale brown, sodium-affected clay loam. The lower part to a depth of 60 inches or more is pale brown clay loam.

Permeability is very slow in the Effington soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Mudray soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sodic shale. Typically, the surface layer is light brownish gray clay loam 2 inches thick. The subsoil is olive, sodium-affected clay 12 inches thick. Soft, sodic shale bedrock is at a depth of about 14 inches. In some areas the surface layer is sandy loam.

Permeability is very slow in the Mudray soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 20 to 40 percent birdfoot sagebrush, 10 to 20 percent bottlebrush squirreltail, 20 to 30 percent western wheatgrass, and 5 to 15 percent Indian ricegrass. As the range condition deteriorates, birdfoot sagebrush and Sandberg bluegrass increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 200 pounds of air-dry vegetation per acre in normal years. Production ranges from 300 pounds in favorable years to 100 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by alkalinity, low precipitation, and droughtiness and by the restricted rooting depth in the Mudray soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Effington soil is in capability subclass VIc, nonirrigated. The Mudray soil is in capability subclass VIIc, nonirrigated. Both soils are in the Impervious Clay, 5- to 9-inch precipitation, Wind River Basin range site.

**144—Emblem-Clifsand-Rairdent complex, 1 to 25 percent slopes.** This map unit is on dissected fan aprons and terraces. Areas are irregular in shape and are 50 to 600 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,800 to 6,200 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit is about 30 percent Emblem sandy loam, 1 to 8 percent slopes; 30 percent Clifsand very gravelly loam, 2 to 25 percent slopes; and 30 percent Rairdent loam, 1 to 8 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Frisite loam, 1 to 10 percent slopes, and Griffy sandy loam, 1 to 10 percent slopes. Also included are small areas of Persayo clay loam, 3 to 25 percent slopes, on terrace escarpments. Included areas make up about 10 percent

of the total acreage. The percentage varies from one area to another.

The Emblem soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, 20 percent of the surface is covered with gravel. The surface layer is light yellowish brown sandy loam 2 inches thick. The upper 8 inches of the subsoil is yellowish brown loam. The next 10 inches is pale brown loam. The next 10 inches is pale brown gravelly loamy sand. The lower part to a depth of 60 inches or more is light gray very gravelly loamy sand. In some areas the surface layer is loam.

Permeability is moderate in the Emblem soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Clifsand soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, about 50 percent of the surface is covered with gravel. The surface layer is brown very gravelly loam 4 inches thick. The upper 2 inches of the subsoil is very pale brown very gravelly sandy loam. The lower part to a depth of 60 inches or more is light olive brown very gravelly sandy loam. In some areas the surface layer is gravelly sandy clay loam or loam.

Permeability is moderately rapid in the Clifsand soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

The Rairdent soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is yellowish brown loam 2 inches thick. The upper 5 inches of the subsoil also is yellowish brown loam. The next 38 inches is light yellowish brown loam that has many large, soft masses of gypsum crystals. The lower part to a depth of 60 inches or more is pale yellow loam. In some areas the surface layer is sandy loam.

Permeability is moderate in the Rairdent soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Emblem and Rairdent soils is mainly 20 to 40 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, 10 to 20 percent needleandthread, and 5 to 15 percent big sagebrush. As the range condition deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds

invade. The potential plant community produces about 400 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 225 pounds in unfavorable years.

The potential plant community on the Clifsand soil is mainly 20 to 40 percent bluebunch wheatgrass, 10 to 20 percent needleandthread, 10 to 25 percent western wheatgrass, 0 to 10 percent Indian ricegrass, and 0 to 15 percent big sagebrush. As the range condition deteriorates, big sagebrush, blue grama, threadleaf sedge, and forbs increase in abundance. As the range condition further deteriorates, annual grasses, weeds, and pricklypear invade. The potential plant community produces about 200 pounds of air-dry vegetation per acre in normal years. Production ranges from 300 pounds in favorable years to 100 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, by the content of salts in the Rairdent soil, and by droughtiness and the content of rock fragments in the Clifsand soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur.

The Emblem and Rairdent soils are in capability subclass Vle, nonirrigated. They are in the Loamy, 5- to 9-inch precipitation, Wind River Basin range site. The Clifsand soil is in capability subclass Vls, nonirrigated. It is in the Gravelly, 5- to 9-inch precipitation, Wind River range site.

**145—Fluvaquents.** These soils are on flood plains. They formed in alluvium derived from various sources. Slopes are 0 to 3 percent. Areas are long and narrow and are 80 to 900 acres in size. The native vegetation is mainly grasses, sedges, rushes, and greasewood. Elevation is 5,400 to 5,700 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 115 to 130 days.

These soils are very deep and poorly drained. Commonly, the surface layer is covered with a mat of peat 2 inches thick. The surface layer is olive gray loam or sandy loam 4 inches thick. The upper 10 inches of the underlying material is brown sandy loam, loam, or clay loam. The lower part to a depth of 60 inches or more is olive, stratified silty clay loam, loam, or sandy loam.

Included in this unit are small areas of salt-affected, somewhat poorly drained Aquic Ustifluvents on valley side slopes and on the higher terraces. Also included are small areas of Haplaquolls in depressions and soils that have a water table below a depth of 4 feet. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability commonly is moderately slow in the Fluvaquents, but it ranges to moderately rapid. Available water capacity commonly is high, but it is moderate in some areas. The effective rooting depth is 60 inches or more. Runoff is ponded or very slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight. The seasonal high water table is at a depth of 0.5 foot to 2.0 feet early in spring and in summer. The water table is at a depth of 2 to 4 feet during the rest of the year. These soils are occasionally flooded for brief periods in May and June. They are moderately saline or strongly saline and are moderately alkaline or strongly alkaline.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 40 to 50 percent alkali sacaton, 15 to 25 percent Nuttall alkaligrass, 5 to 15 percent basin wildrye, and 5 percent greasewood. As the range condition deteriorates, inland saltgrass increases in abundance. As the range condition further deteriorates, annual grasses, weeds, and foxtail barley invade. The potential plant community produces about 2,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,600 pounds in favorable years to 1,800 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by salinity and alkalinity and by wetness. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VIw, nonirrigated. It is in the Saline Subirrigated, 5- to 9-inch precipitation, Wind River Basin range site.

**146—Fluvaquents-Youngston complex, 0 to 3 percent slopes.** This map unit is on fan aprons, terraces, and flood plains. Areas are long and narrow and are 10 to 500 acres in size. The native vegetation is mainly grasses, sedges, and shrubs. Elevation is 5,200 to 6,300 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 115 to 130 days.

This unit is about 60 percent Fluvaquents, 0 to 3 percent slopes, and 25 percent Youngston loam, 0 to 3 percent slopes. The Fluvaquents are on low flood plains, and the Youngston soil is on low terraces and fan aprons. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Effington sandy loam, 1 to 6 percent slopes, and Lostwells sandy clay loam, 0 to 8 percent slopes. Also included are Apron sandy loam, 1 to 8 percent slopes, on alluvial fan aprons; Frisite fine sandy loam, 1 to 5 percent slopes, on alluvial fan aprons and in areas of valley fill; and sand and gravel bars on the bottom of drainageways. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Fluvaquents are very deep and poorly drained. They formed in alluvium derived from various sources. Commonly, the surface layer is light brownish gray sandy loam or loam 4 inches thick. The underlying material to a depth of 60 inches or more is grayish brown sandy loam, sandy clay loam, or clay loam stratified with lenses of sand to clay.

Permeability is moderate in the Fluvaquents. Available water capacity is moderate or high. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight. A saline seasonal high water table is at a depth of 1.0 to 2.5 feet during the period May through July. These soils are occasionally flooded for brief periods from February through June.

The Youngston soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is grayish brown loam 3 inches thick. The underlying material to a depth of 60 inches or more is light olive brown clay loam stratified with thin lenses of fine sandy loam, sandy clay loam, and silty clay loam.

Permeability is moderately slow in the Youngston soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Fluvaquents is mainly 40 to 50 percent alkali sacaton, 15 to 25 percent Nuttall alkaligrass, 5 to 15 percent basin wildrye, and 5 percent greasewood. As the range condition deteriorates, inland saltgrass increases in abundance. As the range condition further deteriorates, annual grasses, weeds, and foxtail barley invade. The potential plant community produces about 2,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,600 pounds in favorable years to 1,800 pounds in unfavorable years.

The potential plant community on the Youngston soil is mainly 25 to 45 percent rhizomatous wheatgrasses, 15 to 25 percent bottlebrush squirreltail, 5 to 10 percent Indian ricegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, blue grama, birdfoot sagebrush, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear, annual grasses, and weeds invade. The potential plant community produces about 300 pounds of air-dry vegetation per acre in normal years. Production ranges from 500 pounds in favorable years to 200 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and by salinity and wetness in the Fluvaquents. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Fluvaquents are in capability subclass Vlw, nonirrigated. They are in the Saline Subirrigated, 5- to 9-inch precipitation, Wind River Basin range site. The Youngston soil is in capability subclass Vle, nonirrigated. It is in the Clayey, 5- to 9-inch precipitation, Wind River Basin range site.

#### **147—Forelle-Luhon loams, 1 to 10 percent slopes.**

This map unit is on fan aprons, terraces, and toe slopes. Areas are irregular in shape and are 40 to 800 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air

temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 50 percent Forelle loam, 1 to 10 percent slopes, and 30 percent Luhon loam, 1 to 10 percent slopes. The Forelle soil is on fan aprons and toe slopes, and the Luhon soil is on fan aprons and terraces. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Blazon clay loam, 3 to 20 percent slopes, and Brownsto loam, 1 to 10 percent slopes, adjacent to the Luhon soil. Also included are small areas of Diamondville loam, 1 to 10 percent slopes, and Rockinchair loam, 1 to 10 percent slopes, adjacent to the Forelle soil. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Forelle soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown loam 2 inches thick. The upper 5 inches of the subsoil is yellowish brown clay loam. The next 7 inches is pale brown clay loam. The lower 17 inches is light brownish gray sandy clay loam. The substratum to a depth of 60 inches or more is light brownish gray clay loam. In some areas the surface layer is fine sandy loam or cobbly loam.

Permeability is moderately slow in the Forelle soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Luhon soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown loam 1 inch thick. The upper 6 inches of the subsoil is brown loam. The lower part to a depth of 60 inches or more is light yellowish brown loam.

Permeability is moderate in the Luhon soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Forelle soil is mainly 20 to 30 percent rhizomatous wheatgrasses, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, sedges and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,100 pounds in favorable years

to 500 pounds in unfavorable years.

The potential plant community on the Luhon soil is mainly 20 to 35 percent bluebunch wheatgrass, 10 to 20 percent rhizomatous wheatgrasses, 5 to 15 percent needlegrasses, and 5 to 10 percent black sagebrush. As the range condition deteriorates, bluegrasses, sedges, and black sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 700 pounds in favorable years to 350 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, nonirrigated. The Forelle soil is in the Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site. The Luhon soil is in the Shallow Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site.

**148—Forelle-Poposhia association, 2 to 12 percent slopes.** This map unit is on toe slopes and fan aprons. Areas are irregular in shape and are 80 to 1,000 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 45 percent Forelle loam, 2 to 8 percent slopes, and 40 percent Poposhia loam, 2 to 12 percent slopes. The Forelle soil is on fan aprons, and the Poposhia soil is on toe slopes and fan aprons.

Included in this unit are small areas of Absher fine sandy loam, 1 to 8 percent slopes; Diamondville loam, 2 to 12 percent slopes, on hillslopes; and Elkol silty clay loam, 0 to 3 percent slopes. Also included are small areas of Blazon clay loam, 15 to 30 percent slopes, on

hillslopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Forelle soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown loam 2 inches thick. The upper 14 inches of the subsoil is brown clay loam. The lower 8 inches is light yellowish brown loam. The substratum to a depth of 60 inches or more is very pale brown sandy loam stratified with thin lenses of loam and loamy sand.

Permeability is moderately slow in the Forelle soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Poposhia soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown loam 3 inches thick. The subsoil is pale brown clay loam 12 inches thick. The substratum to a depth of 60 inches or more is pale brown loam.

Permeability is moderate in the Poposhia soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Forelle soil is mainly 30 to 40 percent western wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, rubber rabbitbrush and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Poposhia soil is mainly 40 to 50 percent thickspike wheatgrass, 15 to 25 percent green needlegrass, 5 to 10 percent bluebunch wheatgrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 10 percent big sagebrush. As the range condition deteriorates, rhizomatous wheatgrasses, Canby bluegrass, and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,000 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,300 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is

limited by low precipitation and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, nonirrigated. The Forelle soil is in the Loamy, 10- to 14-inch precipitation, High Plains Southeast range site. The Poposhia soil is in the Clayey, 10- to 14-inch precipitation, High Plains Southeast range site.

**149—Fornor-Decross complex, hilly.** This map unit is on glacial moraines, fan aprons, and toe slopes. Slopes are 1 to 30 percent. Areas are irregular in shape and are 40 to 1,000 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,800 to 8,400 feet. The annual precipitation is 15 to 19 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 50 percent Fornor very cobbly loam, 2 to 30 percent slopes, and 30 percent Decross loam, 1 to 25 percent slopes. The Fornor soil is on glacial moraines, and the Decross soil is on toe slopes and fan aprons. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Absher fine sandy loam, 1 to 8 percent slopes, along drainageways; Roxal sandy clay loam, 10 to 30 percent slopes, on pediment escarpments; Burnette loam, 3 to 10 percent slopes; and Youga loam, 3 to 10 percent slopes. Also included are small areas of Gelkie sandy loam, 2 to 25 percent slopes; a very deep, pale brown, loamy soil in areas where slopes are 1 to 20 percent; and Fornor very cobbly loam, 30 to 40 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Fornor soil is very deep and well drained. It formed in glacial drift. Typically, 40 percent of the surface is covered with gravel, cobbles, and stones. The surface layer is brown very cobbly loam 2 inches thick. The upper 11 inches of the subsoil is dark brown very gravelly sandy clay loam. The lower 6 inches is pale brown extremely gravelly sandy clay loam. The

upper 6 inches of the substratum is pale brown extremely gravelly sandy clay loam. The lower part to a depth of 60 inches or more is very pale brown very gravelly loam. In some areas the surface layer is loam, gravelly loam, or very gravelly loam.

Permeability is moderate in the Fornor soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

The Decross soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown loam 8 inches thick. The upper 13 inches of the subsoil is brown clay loam. The lower part to a depth of 60 inches or more is pale brown loam.

Permeability is moderate in the Decross soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Fornor soil is mainly 10 to 25 percent Columbia needlegrass, 10 to 25 percent Idaho fescue, 5 to 10 percent Kingspike fescue, and 5 to 10 percent antelope bitterbrush. As the range condition deteriorates, Sandberg bluegrass and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 950 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,100 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Decross soil is mainly 10 to 25 percent Columbia needlegrass, 10 to 25 percent Kingspike fescue, 10 to 25 percent Idaho fescue, and 5 to 10 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by a short growing season and by the content of rock fragments in the Fornor soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable

condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. The rock fragments on the surface of the Fornor soil hinder seeding methods that involve tillage and mechanical methods of brush control. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VIe, nonirrigated. The Fornor soil is in the Coarse Upland, 15- to 19-inch precipitation, Foothills and Mountains East range site. The Decross soil is in the Loamy, 15- to 19-inch precipitation, Foothills and Mountains East range site.

#### **150—Frisite-Emblem loams, 1 to 8 percent slopes.**

This map unit is on dissected terraces. Areas are irregular in shape and are 5 to 640 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,000 to 6,200 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit is about 45 percent Frisite loam, 1 to 8 percent slopes, and 35 percent Emblem loam, 1 to 8 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Birdsley sandy clay loam, 1 to 8 percent slopes, on hillslopes; Cliffsand gravelly loam, 2 to 8 percent slopes; and Rairdent sandy loam, 1 to 8 percent slopes. Also included are small areas of Muff loam, 1 to 8 percent slopes, on hillslopes and small areas of Uffens loam, 1 to 8 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Frisite soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is yellowish brown loam 3 inches thick. The upper 20 inches of the subsoil is yellowish brown clay loam. The lower 17 inches is light yellowish brown loam. The substratum to a depth of 60 inches or more is yellowish brown loam.

Permeability is moderate in the Frisite soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Emblem soil is very deep and well drained. It formed in alluvium derived from various sources.

Typically, the surface layer is yellowish brown loam 3 inches thick. The upper 18 inches of the subsoil also is yellowish brown loam. The lower part to a depth of 60 inches or more is very pale brown very gravelly loamy sand.

Permeability is moderate in the Emblem soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland and wildlife habitat. It also is used for irrigated hay and pasture.

The potential plant community on this unit is mainly 10 to 20 percent Indian ricegrass, 20 to 40 percent rhizomatous wheatgrasses, 10 to 20 percent needleandthread, and 5 to 15 percent big sagebrush. As the range condition deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 400 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 225 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur.

This unit is well suited to irrigated hay and pasture. Grazing during wet periods results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, rotation grazing, weed control, and applications of fertilizer are needed to ensure the maximum quality of forage. Annual applications of nitrogen and phosphate fertilizer are needed to maintain the production of high-quality forage. Periodic mowing and clipping help to maintain a uniform plant cover and discourage selective grazing. Leveling helps to ensure a uniform application of water.

The contour ditch or sprinkler irrigation method is suitable on this unit (fig. 7). The furrow or border method also is suitable, especially in nearly level areas. To prevent overirrigation and the leaching of plant nutrients and to control water erosion, applications of irrigation water should be adjusted to the available water capacity and rate of water intake in the soils. A rotation system that includes grasses, legumes, or



**Figure 7.—An irrigated area of Frisite-Emblem loams, 1 to 8 percent slopes. Because of the complex slopes, the best irrigation methods are contour ditch and sprinkler systems.**

grass-legume mixtures helps to maintain fertility and tilth.

This unit is in capability subclasses IIIe, irrigated, and VIe, nonirrigated. It is in the Loamy, 5- to 9-inch precipitation, Wind River Basin range site.

**151—Frisite-Youngston complex, 1 to 8 percent slopes.** This map unit is on fan aprons and terraces. Areas are irregular in shape and are 5 to 320 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,200 to 6,300 feet. The annual precipitation is 5 to 9 inches, the average annual air

temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit is about 60 percent Frisite fine sandy loam, 1 to 8 percent slopes, and 20 percent Youngston loam, 1 to 5 percent slopes. The Frisite soil is on fan aprons and high terraces, and the Youngston soil is on low terraces. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Apron sandy loam, 1 to 8 percent slopes; Effington sandy loam, 1 to 8 percent slopes; and Griffy sandy loam, 1 to 10

percent slopes. Also included, on hillslopes, are small areas of Lostwells sandy clay loam, 1 to 10 percent slopes, and Saddle sandy loam, 1 to 12 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Frisite soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown fine sandy loam 3 inches thick. The upper 3 inches of the subsoil is yellowish brown loam. The next 10 inches is pale brown clay loam. The lower 25 inches is light gray loam. The substratum to a depth of 60 inches or more is light yellowish brown loam. In some areas the surface layer is loam.

Permeability is moderate in the Frisite soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Youngston soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is very pale brown loam 4 inches thick. The underlying material to a depth of 60 inches or more is pale brown loam stratified with lenses of fine sandy loam, sandy clay loam, and silt loam.

Permeability is moderately slow in the Youngston soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland and wildlife habitat. It also is used for irrigated hay and pasture.

The potential plant community on the Frisite soil is mainly 10 to 20 percent Indian ricegrass, 20 to 40 percent rhizomatous wheatgrasses, 10 to 20 percent needleandthread, and 5 to 15 percent big sagebrush. As the range condition deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 400 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 225 pounds in unfavorable years.

The potential plant community on the Youngston soil is mainly 25 to 45 percent rhizomatous wheatgrasses, 15 to 25 percent bottlebrush squirreltail, 5 to 10 percent Indian ricegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, blue grama, birdfoot sagebrush, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 300 pounds of air-dry

vegetation per acre in normal years. Production ranges from 500 pounds in favorable years to 200 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is well suited to irrigated hay and pasture. Applications of nitrogen and phosphate fertilizer improve the growth of forage plants. Grazing during wet periods results in compaction of the surface layer, poor tilth, and excessive runoff. Periodic mowing and clipping help to maintain a uniform plant cover and discourage selective grazing. Proper grazing practices, applications of fertilizer, and rotation grazing help to maintain the quality of forage. Irrigation water can be applied by the sprinkler or flood method. To prevent overirrigation and the leaching of plant nutrients and to control water erosion, applications of irrigation water should be adjusted to the available water capacity and rate of water intake in the soils. Leveling helps to ensure a uniform application of water.

This unit is in capability subclasses IIIe, irrigated, and VIe, nonirrigated. The Frisite soil is in the Loamy, 5- to 9-inch precipitation, Wind River Basin range site. The Youngston soil is in the Clayey, 5- to 9-inch precipitation, Wind River Basin range site.

**152—Gelkie Variant-Barrett Variant association, undulating.** This map unit is on dissected terraces, mountain foot slopes, ridges, and dip slopes on cuestas. Slopes range from 2 to 15 percent. Areas are irregular in shape and are 40 to 150 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 45 percent Gelkie Variant loam, 2 to 8 percent slopes, and 40 percent Barrett Variant very channery very fine sandy loam, 2 to 15 percent slopes. The Gelkie Variant soil is on terraces and mountain foot

slopes, and the Barrett Variant soil is on ridges and dip slopes on cuestas.

Included in this unit are small areas of Poposhia loam, 2 to 15 percent slopes, and Blazon clay loam, 3 to 15 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Gelkie Variant soil is deep and well drained. It formed in alluvium derived dominantly from sandstone interbedded with shale. Typically, the surface layer is brown loam 2 inches thick. The upper 7 inches of the subsoil is brown clay loam. The next 7 inches is pale brown silty clay loam. The lower 26 inches is light yellowish brown and light olive brown clay loam. Soft, sandy shale bedrock is at a depth of about 42 inches.

Permeability is moderately slow in the Gelkie Variant soil. Available water capacity is high. The effective rooting depth is 40 to 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Barrett Variant soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from soft shale. Typically, 25 percent of the surface is covered with gravel and channery fragments. The surface layer is light brownish gray very channery very fine sandy loam 4 inches thick. The upper 7 inches of the underlying material is light brownish gray very channery loam. The lower 7 inches is light brownish gray very channery silty clay loam. Soft shale bedrock is at a depth of about 18 inches.

Permeability is moderate in the Barrett Variant soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Gelkie Variant soil is mainly 30 to 40 percent western wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,000 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Barrett Variant soil is mainly 10 to 25 percent western wheatgrass, 10 to 25 percent bottlebrush squirreltail, 10 to 25 percent Indian ricegrass, and 40 to 50 percent gardner saltbush. As the range condition deteriorates, gardner saltbush and birdfoot sagebrush increase in abundance. As the

range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 650 pounds in favorable years to 300 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season and by droughtiness and the restricted rooting depth in the Barrett Variant soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Gelkie Variant soil is in capability subclass IVe, nonirrigated. It is in the Loamy, 10- to 14-inch precipitation, High Plains Southeast range site. The Barrett Variant soil is in capability subclass VIIe, nonirrigated. It is in the Saline Upland, 10- to 14-inch precipitation, High Plains Southeast range site.

**153—Granile-Ansel complex, hilly.** This map unit is on mountains and hills. Slopes are 5 to 45 percent. Areas are irregular in shape and are 60 to 1,000 acres in size. The native vegetation is mainly trees and an understory of grasses, forbs, and shrubs. Elevation is 8,000 to 9,000 feet. The annual precipitation is 18 to 22 inches, the average annual air temperature is 33 to 38 degrees F, and the frost-free period is 40 to 60 days.

This unit is about 60 percent Granile gravelly sandy loam, 5 to 30 percent slopes, and 25 percent Ansel sandy loam, 5 to 45 percent slopes. The Granile soil is on the foot slopes and back slopes of mountains, and the Ansel soil is on the foot slopes and back slopes of hills. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Youga loam, 2 to 25 percent slopes; Venapass loam, 0 to 3 percent slopes; Silas loam, 0 to 3 percent slopes, in drainageways at the base of ridges; and Quander sandy loam, 5 to 40 percent slopes. Also included are small areas of a soil that is similar to the Granile soil but is moderately well drained. Included areas make up about

15 percent of the total acreage. The percentage varies from one area to another.

The Granile soil is very deep and well drained. It formed in alluvium derived dominantly from granite and schist. Typically, the surface is covered with a mat of undecomposed needles, twigs, and leaves 1 inch thick. The surface layer is dark grayish brown gravelly sandy loam 2 inches thick. The subsurface layer is light brownish gray gravelly sandy loam 5 inches thick. The subsoil is pale yellow very gravelly sandy clay loam 39 inches thick. The substratum to a depth of 60 inches or more is light gray very gravelly sandy loam.

Permeability is moderate in the Granile soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Ansel soil is very deep and well drained. It formed in alluvium derived dominantly from schist. Typically, the surface is covered with a mat of undecomposed forest litter 2 inches thick. The surface layer is pale brown sandy loam 10 inches thick. The subsoil is light yellowish brown sandy clay loam 14 inches thick. The substratum to a depth of 60 inches or more is very pale brown sandy clay loam.

Permeability is moderate in the Ansel soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

This unit is well suited to timber production. The site index for lodgepole pine ranges from 55 to 60. The main limitation affecting timber production and harvesting is the slope. The Granile soil also is limited by droughtiness. Minimizing the risk of erosion is essential when timber is harvested. Properly designed road drainage systems that include carefully located culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding areas that have been cut and filled.

Conventional methods of harvesting timber generally are suitable, but the surface may be compacted if heavy equipment is used during wet periods. The high-lead logging method is more efficient than most other methods and is less damaging to the surface. In the steeper areas the slope limits the kinds of equipment that can be used. Planting the trees on the contour helps to control erosion. Because the soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods. Unsheltered trees are subject to windthrow.

The Granile soil is in capability subclass VIs,

nonirrigated. The Ansel soil is in capability subclass VIe, nonirrigated. The soils are not assigned to a range site.

**154—Griffy-Saddle-Wallson association, undulating.** This map unit is on terraces, fan aprons, hills, ridges, and pediments. Slopes are 1 to 12 percent. Areas are irregular in shape and are 20 to 1,500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,200 to 6,300 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 120 to 130 days.

This unit is about 35 percent Griffy sandy loam, 1 to 8 percent slopes; 35 percent Saddle sandy loam, 1 to 12 percent slopes; and 15 percent Wallson loamy fine sand, 1 to 8 percent slopes. The Griffy soil is on terraces and fan aprons, the Saddle soil is on pediments, hillslopes, and ridges, and the Wallson soil is on fan aprons and toe slopes.

Included in this unit are small areas of Frisite fine sandy loam, 1 to 10 percent slopes, adjacent to the Griffy soil, and small areas of Oceanet sandy loam, 5 to 45 percent slopes. Also included are small areas of Rock outcrop on the summit of ridges and small areas of Saddle sandy loam, 12 to 20 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Griffy soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone interbedded with shale. Typically, the surface layer is pale brown sandy loam 2 inches thick. The upper 4 inches of the subsoil is yellowish brown sandy loam. The next 7 inches is dark yellowish brown sandy clay loam. The next 13 inches is yellowish brown and very pale brown sandy loam. The lower part to a depth of 60 inches or more is yellowish brown fine sandy loam.

Permeability is moderate in the Griffy soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Saddle soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone interbedded with shale. Typically, the surface layer is brown sandy loam 2 inches thick. The upper 11 inches of the subsoil is yellowish brown sandy clay loam. The next 3 inches is pale brown fine sandy loam. The lower 17 inches is light yellowish brown fine sandy loam. Soft, calcareous sandstone bedrock is at a depth of about 33 inches.

Permeability is moderate in the Saddle soil. Available water capacity is low. The effective rooting depth is 20

to 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Wallson soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone. Typically, the surface layer is very pale brown loamy fine sand 4 inches thick. The upper part of the subsoil is yellowish brown fine sandy loam 17 inches thick. The lower part to a depth of 60 inches or more is light gray fine sandy loam.

Permeability is moderately rapid in the Wallson soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 30 to 50 percent needleandthread, 15 to 25 percent Indian ricegrass, 5 to 10 percent rhizomatous wheatgrasses, and 5 to 10 percent big sagebrush. As the range condition deteriorates, blue grama, threadleaf sedge, yucca, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear, annual grasses, and weeds invade. The potential plant community produces about 400 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 225 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and wind erosion and by droughtiness in the Saddle soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VIe, nonirrigated. It is in the Sandy, 5- to 9-inch precipitation, Wind River Basin range site.

**155—Haplaquolls-Aquic Ustifluvents complex, nearly level.** This map unit is on flood plains. Slopes are 0 to 3 percent. Areas are irregular in shape and are 5 to 300 acres in size. The native vegetation is mainly grasses, sedges, shrubs, and scattered willows. Elevation is 6,000 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air

temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 50 percent Haplaquolls, 0 to 3 percent slopes, and 40 percent Aquic Ustifluvents, 0 to 3 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Riverwash. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Haplaquolls are very deep and are very poorly drained or poorly drained. They formed in alluvium derived from various sources. They vary considerably within short distances. Typically, the surface layer is very dark brown sandy loam, loam, or silty clay loam. The underlying material is very dark gray sandy loam, sandy clay loam, loam, silty clay loam, or clay. In some areas it is underlain at various depths by sand or gravel, or both.

Permeability is rapid to slow in the Haplaquolls. Available water capacity is low to high. The effective rooting depth is limited by a fluctuating high water table at a depth of 0.5 foot to 1.5 feet from January through December. Runoff is ponded, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. These soils are frequently flooded for very long periods from May through August.

The Aquic Ustifluvents are very deep and are somewhat poorly drained or poorly drained. They formed in alluvium derived from various sources. They vary considerably within short distances. Typically, the surface layer is brown sandy loam, loam, or clay loam 2 inches thick. The underlying material is brown or very pale brown sandy loam, sandy clay loam, loam, silty clay loam, or clay. In some areas it is underlain at various depths by sand or gravel, or both.

Permeability is rapid to slow in the Aquic Ustifluvents. Available water capacity is low to high. The effective rooting depth is limited by a seasonal high water table at a depth of 1.5 to 3.0 feet from April through September. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. These soils are occasionally flooded for brief periods from April through August. The flooding is a result of snowmelt during April and May and of high-intensity storms in other months.

Most areas of this unit are used for irrigated hay and pasture or for wildlife habitat. A few areas are used as rangeland.

The main limitation in the areas used for irrigated hay and pasture is wetness, which restricts the choice of plants and the period of cutting or grazing and increases the risk of winterkill. The use of equipment is

limited during spring and during other wet periods. Grazing should be delayed until the soils have drained sufficiently and are firm enough to withstand trampling by livestock. Rotation grazing helps to maintain the quality of forage. Applications of nitrogen and phosphate fertilizer improve the growth of forage plants.

Irrigation water can be applied by the sprinkler, contour ditch, border, or furrow method. To prevent overirrigation and the leaching of plant nutrients and to control water erosion, applications of irrigation water should be adjusted to the available water capacity and rate of water intake in the soils. Leveling helps to ensure a uniform application of water.

The potential plant community on the Haplaquolls is mainly 15 to 25 percent Nebraska sedge, 10 to 20 percent northern reedgrass, 10 to 20 percent tufted hairgrass, and 5 to 15 percent willows. As the range condition deteriorates, willows and roses increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 5,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 6,500 pounds in favorable years to 4,500 pounds in unfavorable years.

The potential plant community on the Aquic Ustifluvents is mainly 35 to 50 percent basin wildrye, 15 to 25 percent slender wheatgrass, 5 to 10 percent tufted hairgrass, and 5 to 10 percent willows. As the range condition deteriorates, forbs and willows increase in abundance. As the range condition further deteriorates, Kentucky bluegrass and annual forbs invade. The potential plant community produces about 3,600 pounds of air-dry vegetation per acre in normal years. Production ranges from 4,500 pounds in favorable years to 2,800 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by the flooding and by the wetness of the Haplaquolls. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Haplaquolls are in capability subclass Vw, irrigated and nonirrigated. They are in the Wetland, 10- to 14-inch precipitation, Foothills and Basins East range site. The Aquic Ustifluvents are in capability subclasses IIIc, irrigated, and IVc, nonirrigated. They are in the

Subirrigated, 10- to 14-inch precipitation, Foothills and Basins East range site.

**156—Haverdad-Clarkelen complex, 0 to 3 percent slopes.** This map unit is on flood plains. Areas are long and narrow and are 20 to 200 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 6,200 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 45 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit is about 50 percent Haverdad loam, 0 to 3 percent slopes, and 35 percent Clarkelen sandy loam, 0 to 3 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Riverwash; Hiland sandy loam, 1 to 3 percent slopes, on fan aprons; and Effington loam, 0 to 3 percent slopes. Also included are small areas of soils that are similar to the Haverdad and Clarkelen soils but are moderately well drained. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Haverdad soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the upper 2 inches of the surface layer is pale brown loam. The lower 8 inches is brown loam. The upper 24 inches of the underlying material is light yellowish brown loam stratified with thin lenses of sandy clay loam, sandy loam, and loamy sand. The lower part to a depth of 60 inches or more is pale brown loam stratified with thin lenses of sandy loam, loamy sand, sandy clay loam, and clay loam.

Permeability is moderate in the Haverdad soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. This soil is subject to rare flooding from April through June.

The Clarkelen soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown sandy loam 2 inches thick. The subsurface layer is brown loam 3 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown sandy loam stratified with thin lenses of loamy sand and loam.

Permeability is moderately rapid in the Clarkelen soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe. This soil is subject to rare flooding from April through June.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 25 to 35 percent rhizomatous wheatgrasses, 10 to 20 percent slender wheatgrass, 10 to 20 percent needlegrasses, and 5 to 10 percent big sagebrush. As the range condition deteriorates, big sagebrush and bluegrasses increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,200 pounds in favorable years to 1,200 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VIe, nonirrigated. It is in the Loamy Overflow, 10- to 14-inch precipitation, High Plains Southeast range site.

**157—Havre-Absher-Forelle loams, 0 to 6 percent slopes.** This map unit is on flood plains, terraces, and toe slopes. Areas are irregular in shape and are 5 to 640 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 40 percent Havre loam, 0 to 3 percent slopes; 20 percent Absher loam, 1 to 6 percent slopes; and 20 percent Forelle loam, 1 to 6 percent slopes. The Havre soil is on flood plains, the Absher soil is on terraces and toe slopes, and the Forelle soil is on toe slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of slick spots; Elkol silty clay loam, 0 to 3 percent slopes; Glendive sandy loam, 0 to 3 percent slopes; and Poposhia loam, 1 to 3 percent slopes. Also included are small areas of Diamondville loam, 1 to 6 percent slopes, on hillslopes and small areas of Haplaquolls, 0 to 3 percent slopes, and Aquic Ustifluvents, 0 to 3 percent slopes, in the

DuNoir drainage area, near Dubois. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Havre soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown loam 3 inches thick. The underlying material to a depth of 60 inches or more is light olive brown loam stratified with lenses of fine sandy loam, clay loam, and silty clay loam.

Permeability is moderate in the Havre soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Absher soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown loam 3 inches thick. The upper 15 inches of the subsoil is brown, sodium-affected silty clay loam. The next 6 inches is grayish brown, sodium-affected silty clay loam. The substratum to a depth of 60 inches or more is pale brown silty clay loam stratified with lenses of loam, clay loam, and clay.

Permeability is very slow in the Absher soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Forelle soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is yellowish brown loam 8 inches thick. The upper 16 inches of the subsoil is yellowish brown clay loam. The lower 8 inches is light yellowish brown clay loam. The substratum to a depth of 60 inches or more is very pale brown clay loam.

Permeability is moderately slow in the Forelle soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland and wildlife habitat. It also is used for irrigated hay and pasture.

The potential plant community on the Havre soil is mainly 25 to 35 percent rhizomatous wheatgrasses, 10 to 20 percent slender wheatgrass, 10 to 20 percent needlegrasses, and 5 to 10 percent big sagebrush. As the range condition deteriorates, bluegrasses and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,200 pounds in favorable years to 1,200 pounds in unfavorable years.

The potential plant community on the Absher soil is

mainly 15 to 30 percent alkali sacaton, 10 to 20 percent basin wildrye, 5 to 10 percent rhizomatous wheatgrasses, and 10 to 25 percent greasewood. As the range condition deteriorates, inland saltgrass and greasewood increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,500 pounds in favorable years to 1,200 pounds in unfavorable years.

The potential plant community on the Forelle soil is mainly 30 to 40 percent western wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season and by alkalinity in the Absher soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is moderately well suited to irrigated hay and pasture. The main limitations are a short growing season and alkalinity in the Absher soil. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Irrigation water can be applied by the flood or sprinkler method. Leveling helps to ensure a uniform application of water. To prevent overirrigation and the leaching of plant nutrients and to control water erosion, applications of irrigation water should be adjusted to the available water capacity and rate of water intake in the soils. Annual applications of nitrogen and phosphate fertilizer are needed to maintain the production of high-quality forage.

The Havre soil is in capability subclasses IVc, nonirrigated, and IIIc, irrigated. It is in the Loamy

Overflow, 10- to 14-inch precipitation, High Plains Southeast range site. The Absher soil is in capability subclass VI, irrigated and nonirrigated. It is in the Saline Lowland, 10- to 14-inch precipitation, High Plains Southeast range site. The Forelle soil is in capability subclasses IVe, nonirrigated, and IIIe, irrigated. It is in the Loamy, 10- to 14-inch precipitation, High Plains Southeast range site.

**158—Havre-Forelle-Glendive complex, 0 to 3 percent slopes.** This map unit is on flood plains and toe slopes. Areas are long and narrow and are 30 to 400 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 7,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days. The Havre and Glendive soils receive additional moisture in the form of runoff from the higher adjacent areas.

This unit is about 45 percent Havre loam, 0 to 3 percent slopes; 20 percent Forelle loam, 1 to 3 percent slopes; and 15 percent Glendive sandy loam, 0 to 3 percent slopes. The Havre and Glendive soils are on flood plains, and the Forelle soil is on toe slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Bosler sandy loam, 1 to 3 percent slopes, and Rock River sandy loam, 1 to 3 percent slopes. Also included is a somewhat poorly drained, coarse textured soil in the Green Mountain area. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Havre soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown loam 4 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown and light yellowish brown sandy clay loam stratified with lenses of very fine sandy loam, fine sandy loam, and clay loam.

Permeability is moderate in the Havre soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Forelle soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is very pale brown loam 5 inches thick. The subsoil is pale brown clay loam 14 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown sandy loam.

Permeability is moderately slow in the Forelle soil. Available water capacity is high. The effective rooting

depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Glendive soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown sandy loam 4 inches thick. The underlying material to a depth of 60 inches or more is pale brown sandy loam stratified with thin lenses of loamy sand, loam, and sandy clay loam.

Permeability is moderately rapid in the Glendive soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Havre and Glendive soils is mainly 25 to 35 percent rhizomatous wheatgrasses, 10 to 20 percent slender wheatgrass, 10 to 20 percent needlegrasses, and 5 to 10 percent big sagebrush. As the range condition deteriorates, bluegrasses and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,200 pounds in favorable years to 1,200 pounds in unfavorable years.

The potential plant community on the Forelle soil is mainly 30 to 40 percent western wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, rabbitbrush and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more

desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVc, nonirrigated. The Havre and Glendive soils are in the Loamy Overflow, 10- to 14-inch precipitation, High Plains Southeast range site. The Forelle soil is in the Loamy, 10- to 14-inch precipitation, High Plains Southeast range site.

**159—Havre-Havre Variant-Elkol complex, 0 to 3 percent slopes.** This map unit is on flood plains and terraces and in swales and seep areas. Areas are long and narrow and are 10 to 1,000 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 7,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 50 percent Havre loam, 1 to 3 percent slopes; 15 percent Havre Variant loam, 0 to 3 percent slopes; and 15 percent Elkol clay, 0 to 3 percent slopes. The Havre soil is on flood plains, the Havre Variant soil is in swales and seep areas, and the Elkol soil is on terraces. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Absher loam, 0 to 3 percent slopes; Glendive sandy loam, 0 to 3 percent slopes; and Poposhia loam, 1 to 3 percent slopes. Also included are small areas of Forelle loam, 1 to 3 percent slopes, on fan aprons. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Havre soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is light yellowish brown loam 2 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown loam stratified with thin lenses of fine sandy loam and clay loam.

Permeability is moderate in the Havre soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Havre Variant soil is very deep and somewhat poorly drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown loam 1 inch thick. The underlying material to a depth of 60 inches or more is brown sandy clay loam stratified with thin lenses of sand to clay loam.

Permeability is moderate in the Havre Variant soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind

erosion is moderate. A saline seasonal high water table fluctuates between depths of 1.0 and 3.5 feet during the period April through September.

The Elkol soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown clay 2 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown, sodium-affected clay.

Permeability is slow in the Elkol soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Havre soil is mainly 25 to 35 percent rhizomatous wheatgrasses, 10 to 20 percent slender wheatgrass, 10 to 20 percent needlegrasses, and 5 to 10 percent big sagebrush. As the range condition deteriorates, bluegrasses and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,200 pounds in favorable years to 1,200 pounds in unfavorable years.

The potential plant community on the Havre Variant soil is mainly 50 to 60 percent alkali sacaton, 15 to 25 percent basin wildrye, 5 to 10 percent inland saltgrass, and 5 to 10 percent rubber rabbitbrush. As the range condition deteriorates, greasewood and inland saltgrass increase in abundance. As the range condition further deteriorates, annual grasses and forbs invade. The potential plant community produces about 3,000 pounds of air-dry vegetation per acre in normal years. Production ranges from 3,400 pounds in favorable years to 2,500 pounds in unfavorable years.

The potential plant community on the Elkol soil is mainly 15 to 30 percent alkali sacaton, 10 to 20 percent basin wildrye, 5 to 10 percent rhizomatous wheatgrasses, and 10 to 25 percent greasewood. As the range condition deteriorates, inland saltgrass and greasewood increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,500 pounds in favorable years to 1,200 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season and by salinity in the Havre Variant soil and alkalinity in the Elkol soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional

management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Havre soil is in capability subclass IVc, nonirrigated. It is in the Loamy Overflow, 10- to 14-inch precipitation, High Plains Southeast range site. The Havre Variant soil is in capability subclass VIw, nonirrigated. It is in the Saline Subirrigated, 10- to 14-inch precipitation, High Plains Southeast range site. The Elkol soil is in capability subclass VIc, nonirrigated. It is in the Saline Lowland, 10- to 14-inch precipitation, High Plains Southeast range site.

**160—Highpoint-Rock outcrop complex, steep.** This map unit is on ridges. Slopes are 15 to 50 percent. Areas are irregular in shape and are 40 to 320 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 7,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 45 percent Highpoint channery clay loam, 15 to 50 percent slopes, and 35 percent Rock outcrop. The Highpoint soil is on ridges, and the Rock outcrop occurs as bands on the summit of ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Blackhall fine sandy loam, 5 to 40 percent slopes; Blazon clay loam, 10 to 40 percent slopes; Carmody fine sandy loam, 5 to 40 percent slopes; and Cragosen gravelly loam, 5 to 50 percent slopes. Also included are small areas of Poposhia loam, 1 to 10 percent slopes, on fan aprons and toe slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Highpoint soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from fissile shale. Typically, the surface layer is light brownish gray channery clay loam 1 inch thick. The underlying material is light brownish gray very channery clay loam 10 inches thick. Fissile shale bedrock is at a depth of about 11 inches.

Permeability is moderate in the Highpoint soil. Available water capacity is low. The effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard

of water erosion is severe. The hazard of wind erosion is slight.

The Rock outcrop occurs as exposures of fissile shale.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Highpoint soil is mainly 20 to 40 percent rhizomatous wheatgrasses, 5 to 15 percent bluebunch wheatgrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 10 percent winterfat. As the range condition deteriorates, bluegrasses and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, the restricted rooting depth, droughtiness, the content of rock fragments, and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion.

Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Highpoint soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Clayey, 10- to 14-inch precipitation, High Plains Southeast range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site.

**161—Hiland sandy loam, 1 to 15 percent slopes.**

This very deep, well drained soil is on stabilized dunes and fan aprons. It formed in eolian deposits and alluvium derived from various sources. Areas are irregular in shape and are 40 to 600 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,200 to 6,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 45 to 49 degrees F, and the frost-free period is 115 to 130 days.

Included in this unit are small areas of Bowbac fine sandy loam, 1 to 15 percent slopes, and Vonalee loamy sand, 1 to 12 percent slopes, on hillslopes. Included areas make up about 25 percent of the total acreage.

Typically, the surface layer of the Hiland soil is brown sandy loam 3 inches thick. The upper 12 inches of the

subsoil is yellowish brown sandy clay loam. The next 18 inches is light yellowish brown sandy loam. The substratum to a depth of 60 inches or more is light yellowish brown loamy sand.

Permeability is moderate. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and silver sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and wind erosion. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**162—Hoodle-Rock outcrop complex, 1 to 8 percent slopes.**

This map unit is on terraces, knobs, and the summit of hills. Areas are irregular in shape and are 40 to 200 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 8,000 to 8,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 65 percent Hoodle gravelly sandy loam, 1 to 8 percent slopes, and 20 percent Rock outcrop. The Hoodle soil is on terraces, and the Rock outcrop is on knobs and the summit of hills. The components of this unit occur as areas so intricately

intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Irigul channery loam, 3 to 8 percent slopes; Mosroc very gravelly fine sandy loam, 1 to 8 percent slopes, on hillslopes; and Gelkie loam, 2 to 8 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Hoodle soil is very deep and well drained. It formed in alluvium derived dominantly from granite and schist. Typically, the surface layer is brown gravelly sandy loam 3 inches thick. The upper 7 inches of the subsoil is dark brown very gravelly sandy clay loam. The next 6 inches is yellowish brown very gravelly sandy clay loam. The lower 22 inches is light brownish gray very gravelly sandy loam. The substratum to a depth of 60 inches or more is light gray very gravelly sandy loam.

Permeability is moderate in the Hoodle soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Rock outcrop occurs as exposures of granite or schist.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Hoodle soil is mainly 40 to 50 percent bluebunch wheatgrass, 5 to 10 percent Indian ricegrass, 5 to 10 percent needleandthread, and 5 to 10 percent perennial forbs. As the range condition deteriorates, sedges and shrubs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 450 pounds of air-dry vegetation per acre in normal years. Production ranges from 650 pounds in favorable years to 300 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by droughtiness, low precipitation, a short growing season, and the content of rock fragments. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soil is firm and the more desirable

forage plants have achieved enough growth to withstand grazing pressure.

The Hoodle soil is in capability subclass VIs, nonirrigated. It is in the Gravelly, 10- to 14-inch precipitation, High Plains Southeast range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site.

**163—Hoodle-Gelkie association, 2 to 15 percent slopes.** This map unit is on dissected mountain pediments. Areas are irregular in shape and are 80 to 640 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days. The Gelkie soil receives additional moisture in the form of runoff from melting snowdrifts.

This unit is about 55 percent Hoodle gravelly loam, 2 to 15 percent slopes, and 25 percent Gelkie loam, 2 to 10 percent slopes.

Included in this unit are small areas of Abston fine sandy loam, 2 to 8 percent slopes, on hillslopes; Lymanson gravelly loam, 4 to 15 percent slopes, on hillslopes, ridges, and pediments; and Midelight channery loam, 1 to 15 percent slopes, on hillslopes. Also included are small areas of Irigul channery loam, 15 to 25 percent slopes, on hillslopes and ridges. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Hoodle soil is very deep and well drained. It formed in alluvium derived dominantly from granite and schist. Typically, 25 percent of the surface is covered with gravel and channery fragments. The surface layer is brown gravelly loam 3 inches thick. The upper 7 inches of the subsoil is dark brown very gravelly sandy clay loam. The next 3 inches is yellowish brown very gravelly sandy clay loam. The lower 17 inches is light brownish gray very gravelly sandy loam. The substratum to a depth of 60 inches or more is light gray very gravelly sandy loam.

Permeability is moderate in the Hoodle soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

The Gelkie soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone. Typically, the surface layer is brown loam 7 inches thick. The upper 22 inches of the subsoil is brown sandy clay loam. The lower 6 inches is very pale brown sandy loam. The substratum to a depth of 60 inches or more also is very pale brown sandy loam.

Permeability is moderate in the Gelkie soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Hoodle soil is mainly 40 to 50 percent bluebunch wheatgrass, 5 to 10 percent Indian ricegrass, 5 to 10 percent needleandthread, and 5 to 10 percent perennial forbs. As the range condition deteriorates, sedges and shrubs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 450 pounds of air-dry vegetation per acre in normal years. Production ranges from 650 pounds in favorable years to 300 pounds in unfavorable years.

The potential plant community on the Gelkie soil is mainly 25 to 35 percent rhizomatous wheatgrasses, 10 to 20 percent slender wheatgrass, 10 to 20 percent needlegrasses, and 5 to 10 percent big sagebrush. As the range condition deteriorates, big sagebrush and bluegrasses increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,200 pounds in favorable years to 1,200 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season and by the content of rock fragments in the Hoodle soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Because of the rock fragments on the surface of the Hoodle soil, broadcasting is the best seeding method. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Hoodle soil is in capability subclass VI<sub>1</sub>, nonirrigated. It is in the Gravelly, 10- to 14-inch precipitation, High Plains Southeast range site. The Gelkie soil is in capability subclass VI<sub>1e</sub>, nonirrigated. It is in the Loamy Overflow, 10- to 14-inch precipitation, High Plains Southeast range site.

**164—Iceslew-Countryman complex, 0 to 3 percent slopes.** This map unit is on flood plains and valley toe slopes. Areas are irregular in shape and are 10 to 1,000 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,800 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 115 days.

This unit is about 55 percent Iceslew very fine sandy loam, 0 to 3 percent slopes, and 30 percent Countryman loam, 0 to 3 percent slopes. The Iceslew soil is on flood plains and valley toe slopes, and the Countryman soil is on flood plains. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Absher loam, 1 to 8 percent slopes, and Ryan Park loamy fine sand, 1 to 10 percent slopes, on fan aprons. Also included are small areas of Bosler fine sandy loam, 1 to 8 percent slopes, on terraces; Forelle loam, 1 to 8 percent slopes, on toe slopes; and Iceslew very fine sandy loam, 3 to 6 percent slopes, in seeps on toe slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Iceslew soil is very deep and poorly drained. It formed in alluvium derived dominantly from sandstone and siltstone. Typically, the surface layer is pale brown very fine sandy loam 2 inches thick. The upper 6 inches of the underlying material is pale brown loam. The next 4 inches is light brownish gray sandy loam. The next 20 inches is pale brown loam. The lower part to a depth of 60 inches or more is olive gray loam that is stratified with thin lenses of fine sandy loam and very fine sandy loam and has dark gray and brown mottles.

Permeability is moderate in the Iceslew soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is ponded, and the hazard of water erosion is slight. The hazard of wind erosion also is slight. In spring the water table is 1 foot above to 20 inches below the surface. During the rest of the year, it is at a depth of 6 to 30 inches. This soil is occasionally flooded for brief periods from March through August.

The Countryman soil is very deep and somewhat poorly drained. It formed in alluvium derived from various sources. Typically, the surface layer is dark brown loam 2 inches thick. The upper 13 inches of the underlying material is dark brown and brown very fine sandy loam. The next 6 inches is dark grayish brown sandy loam. The lower part to a depth of 60 inches or more is dark grayish brown sandy loam stratified with thin lenses of fine sandy loam and loam.

Permeability is moderate in the Countryman soil.

Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. A saline seasonal high water table is at a depth of 1.5 to 3.5 feet during the period May through September. This soil is occasionally flooded for brief periods from March through July.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 50 to 60 percent alkali sacaton, 15 to 25 percent basin wildrye, 5 to 10 percent inland saltgrass, and 5 to 10 percent rubber rabbitbrush. As the range condition deteriorates, inland saltgrass and greasewood increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 3,000 pounds of air-dry vegetation per acre in normal years. Production ranges from 3,400 pounds in favorable years to 2,500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by flooding, salinity, wetness, and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Iceslew soil is in capability subclass VIw, nonirrigated. The Countryman soil is in capability subclass IVw, nonirrigated. Both soils are in the Saline Subirrigated, 10- to 14-inch precipitation, High Plains Southeast range site.

**165—Inchau-Youga loams, 10 to 30 percent slopes.** This map unit is on mountains and hills. Areas are irregular in shape and are 40 to 320 acres in size. The native vegetation is mainly grasses and shrubs and scattered trees. Elevation is 7,400 to 8,500 feet. The annual precipitation is 15 to 19 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 40 percent Inchau loam, 10 to 30 percent slopes, and 40 percent Youga loam, 10 to 30 percent slopes. The Inchau soil is on the side slopes of mountains and hills, and the Youga soil is on foot slopes. The components of this unit occur as areas so

intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Farlow Variant loam, 10 to 30 percent slopes; Tongue River loam, 10 to 30 percent slopes; and Burnette loam, 3 to 10 percent slopes. Also included are small areas of Roxal sandy clay loam, 30 to 65 percent slopes, and small areas of Owen Creek stony clay loam, 2 to 15 percent slopes, on hillslopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Inchau soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone interbedded with shale. Typically, the surface layer is dark grayish brown loam 1 inch thick. The upper 9 inches of the subsoil is dark grayish brown clay loam. The next 13 inches is brown and light yellowish brown sandy clay loam. The lower 5 inches is light yellowish brown sandy clay loam. Soft sandstone bedrock is at a depth of about 28 inches. In some areas the surface layer is sandy clay loam.

Permeability is moderate in the Inchau soil. Available water capacity also is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Youga soil is very deep and well drained. It formed in residuum and slope alluvium derived from various sources. Typically, the surface layer is very dark grayish brown loam 2 inches thick. The subsoil is brown sandy clay loam 23 inches thick. The substratum to a depth of 60 inches or more is light olive brown and light yellowish brown sandy clay loam. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Youga soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 10 to 25 percent Columbia needlegrass, 10 to 25 percent Kingspike fescue, 10 to 25 percent Idaho fescue, and 5 to 10 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

The production of vegetation suitable for grazing is

limited mainly by a short growing season. Also, the slope limits access by livestock in the steeper areas. As a result, the less sloping areas tend to be overgrazed. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VIe, nonirrigated. It is in the Loamy, 15- to 19-inch precipitation, Foothills and Mountains East range site.

**166—Irigul-Midelight-Rock outcrop association, rolling.** This map unit is on mountains, hills, and pediments. Slopes are 1 to 15 percent. Areas are irregular in shape and are 10 to 600 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 35 percent Irigul channery loam, 3 to 15 percent slopes; 30 percent Midelight channery loam, 1 to 15 percent slopes; and 15 percent Rock outcrop. The Irigul soil is on mountains and hills, the Midelight soil is on hills and pediments, and the Rock outcrop is on escarpments and the summit of ridges and in narrow bands on hills.

Included in this unit are small areas of Lymanson gravelly loam, 4 to 25 percent slopes. Also included are small areas of Uhl loam, 0 to 6 percent slopes, along drainageways at the base of hills and small areas of Hoodle very gravelly loam, 2 to 15 percent slopes, on strath terraces. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Irigul soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from granite and schist. Typically, 40 percent of the surface is covered with channery fragments and stones. The upper 3 inches of the surface layer is dark brown channery loam. The lower 6 inches is dark yellowish brown channery loam. The substratum is brown very channery loam 6 inches thick. Hard schist bedrock is at a depth of about 15 inches.

Permeability is moderate in the Irigul soil. Available water capacity is low. The effective rooting depth is 6 to 20 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of wind erosion also is slight.

The Midelight soil is deep and well drained. It formed in residuum and slope alluvium derived dominantly from schist and gneiss. Typically, 35 percent of the surface is covered with small channery fragments and stones. The surface layer is brown channery loam 5 inches thick. The subsoil is yellowish brown very channery loam 16 inches thick. The substratum is light olive brown very channery loam 20 inches thick. Hard schist bedrock is at a depth of about 41 inches.

Permeability is moderate in the Midelight soil. Available water capacity is low. The effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of wind erosion also is slight.

The Rock outcrop occurs as exposures of schist, gneiss, and granite.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Irigul soil is mainly 20 to 40 percent bluebunch wheatgrass, 5 to 15 percent Indian ricegrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 15 percent rhizomatous wheatgrasses. As the range condition deteriorates, big sagebrush, low rabbitbrush, and unpalatable forbs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Midelight soil is mainly 40 to 50 percent bluebunch wheatgrass, 5 to 10 percent Indian ricegrass, 5 to 10 percent needleandthread, and 5 to 10 percent perennial forbs. As the range condition deteriorates, sedges and shrubs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 450 pounds of air-dry vegetation per acre in normal years. Production ranges from 650 pounds in favorable years to 300 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season, by the restricted rooting depth and droughtiness in the Irigul soil, and by the rock fragments on the surface of the Midelight soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on

rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Mechanical treatment is not practical because of the Rock outcrop and the rock fragments on the surface of the Midlight soil. Brush can be controlled by aerial spraying or prescribed burning. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Broadcasting is a suitable method of seeding.

The Irigul soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Loamy, 10- to 14-inch precipitation, High Plains Southeast range site. The Midlight soil is in capability subclass VIe, nonirrigated. It is in the Gravelly, 10- to 14-inch precipitation, High Plains Southeast range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site.

**167—Irigul-Rock outcrop complex, steep.** This map unit is on mountains and hills. Slopes are 6 to 60 percent. Areas are irregular in shape and are 40 to 400 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 55 percent Irigul very channery loam, 6 to 60 percent slopes, and 30 percent Rock outcrop. The Irigul soil is on mountainsides and hillslopes, and the Rock outcrop is on the summit of mountain ridges and on escarpments. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Ansel loam, 5 to 45 percent slopes, and Midlight channery loam. Also included are small areas of Hoodle very gravelly loam, 1 to 6 percent slopes, on terraces. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Irigul soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from granite and schist. Typically, 40 percent of the surface is covered with channery fragments. The upper 7 inches of the surface layer is brown very channery loam. The lower 4 inches is dark yellowish brown very channery loam. Hard schist bedrock is at a depth of about 11 inches.

Permeability is moderate in the Irigul soil. Available water capacity is low. The effective rooting depth is 7 to 20 inches. Runoff is medium or rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Rock outcrop occurs as exposures of schist and granite.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Irigul soil is mainly 20 to 40 percent bluebunch wheatgrass, 5 to 15 percent Indian ricegrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 15 percent rhizomatous wheatgrasses. As the range condition deteriorates, big sagebrush, low rabbitbrush, and undesirable forbs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 600 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by the restricted rooting depth, low precipitation, a short growing season, droughtiness, and the content of rock fragments. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion.

Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Mechanical treatment is not practical because of the Rock outcrop, the rock fragments on the surface, and the slope. Brush can be controlled by aerial spraying or prescribed burning. Range seeding may be needed if the amount of desirable vegetation left is not sufficient for natural seeding to occur. Broadcasting is a suitable method of seeding. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Irigul soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Loamy, 10- to 14-inch precipitation, High Plains Southeast range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site.

**168—Lander-Lander Variant loams, 0 to 3 percent slopes.** This map unit is on flood plains. Areas are long and narrow and are 5 to 300 acres in size. The native vegetation is mainly grasses and shrubs and scattered willow and cottonwood. Elevation is 6,000 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 45 percent Lander loam, 0 to 3 percent slopes, and 40 percent Lander Variant loam, 0

to 3 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Haplaquolls, 0 to 3 percent slopes; Countryman loam, 0 to 3 percent slopes; Aquic Ustifluvents, 0 to 3 percent slopes; and Lander loam, 3 to 6 percent slopes. Also included are small areas of Riverwash. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Lander soil is very deep and somewhat poorly drained. It formed in alluvium derived from various sources. Typically, the surface layer is grayish brown loam 13 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray and light olive gray loam.

Permeability is moderate in the Lander soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. The seasonal high water table fluctuates between depths of 1.5 and 3.5 feet during the period May through September. In most areas this soil is occasionally flooded for brief periods from April through August. In areas along DuNoir Creek, however, it is subject to flooding of long duration during periods of heavy runoff in the spring.

The Lander Variant soil is very deep and somewhat poorly drained. It formed in alluvium derived from various sources. Typically, the surface layer is dark brown loam 15 inches thick. The underlying material to a depth of 60 inches or more is dark brown very gravelly sand stratified with a few thin lenses of fine sandy loam, loam, and silt loam.

Permeability is moderate in the Lander Variant soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The seasonal high water table fluctuates between depths of 1.5 and 3.5 feet during the period May through September. This soil is occasionally flooded for brief periods from April through August.

This unit is used mainly as rangeland and wildlife habitat. It also is used for irrigated hay and pasture.

The potential plant community on this unit is mainly 35 to 50 percent basin wildrye, 15 to 25 percent slender wheatgrass, 5 to 10 percent tufted hairgrass, and 5 to 10 percent willows. As the range condition deteriorates, forbs and willows increase in abundance. As the range condition further deteriorates, Kentucky bluegrass and annual forbs invade. The potential plant community produces about 3,600 pounds of air-dry vegetation per acre in normal years. Production ranges from 4,500

pounds in favorable years to 2,800 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur.

If this unit is used for irrigated hay and pasture, the main management concerns are the hazard of flooding and a short growing season. Proper grazing practices, rotation grazing, weed control, and applications of fertilizer are needed to ensure the maximum quality of forage. Grazing should be delayed until the soils have drained sufficiently and are firm enough to withstand trampling by livestock. Periodic mowing and clipping help to maintain a uniform plant cover and discourage selective grazing. Irrigation water can be applied by the contour ditch, border, furrow, or sprinkler method. To prevent overirrigation and the leaching of plant nutrients and to control water erosion, applications of irrigation water should be adjusted to the available water capacity and rate of water intake in the soils. Leveling helps to ensure a uniform application of water.

This unit is in capability subclasses IVw, nonirrigated, and IIIw, irrigated. It is in the Subirrigated, 10- to 14-inch precipitation, Foothills and Basins East range site.

**169—Luhon-Rock River-Forelle complex, undulating.** This map unit is on fan aprons, toe slopes, and terraces. Slopes are 1 to 8 percent. Areas are irregular in shape and are 80 to 640 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,000 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 45 percent Luhon loam, 1 to 8 percent slopes; 25 percent Rock River fine sandy loam, 3 to 8 percent slopes; and 15 percent Forelle loam, 1 to 8 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Blackhall fine sandy loam, 5 to 25 percent slopes, on hills, ridges, and knobs; Carmody fine sandy loam, 2 to 20 percent slopes, on hills and ridges; and Cragosen gravelly loam,

3 to 25 percent slopes, on the summit of hills and ridges. Also included are small areas of Bosler fine sandy loam, 1 to 8 percent slopes, and small areas of Rock outcrop on the summit of hills and ridges. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Luhon soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown loam 4 inches thick. The upper 9 inches of the subsoil is pale brown loam. The next part is white loam 14 inches thick. The lower part to a depth of 60 inches or more is very pale brown loam.

Permeability is moderate in the Luhon soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Rock River soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown fine sandy loam 3 inches thick. The upper 17 inches of the subsoil is yellowish brown and light yellowish brown sandy clay loam. The lower 14 inches is pale brown fine sandy loam. The substratum to a depth of 60 inches or more is very pale brown fine sandy loam.

Permeability is moderate in the Rock River soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Forelle soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown loam 6 inches thick. The upper 8 inches of the subsoil is dark brown and brown clay loam. The next 4 inches is pale brown clay loam. The lower 12 inches is light gray loam. The substratum to a depth of 60 inches or more is very pale brown loam.

Permeability is moderately slow in the Forelle soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Luhon soil is mainly 15 to 25 percent bluebunch wheatgrass, 15 to 25 percent western wheatgrass, 5 to 10 percent mutton bluegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, threadleaf sedge and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces

about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Rock River soil is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Forelle soil is mainly 30 to 40 percent western wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, nonirrigated. The Luhon soil is in the Shallow Loamy, 10- to 14-inch precipitation, High Plains Southeast range site. The Rock River soil is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site. The Forelle soil is in the Loamy, 10- to 14-inch precipitation, High Plains Southeast range site.

**170—Lupinto loam, 1 to 6 percent slopes.** This very deep, well drained soil is on terraces. It formed in alluvium derived from various sources. Areas are irregular in shape and are 15 to 1,000 acres in size. The native vegetation is mainly grasses and shrubs.

Elevation is 7,000 to 8,300 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

Included in this unit are small areas of Almy loam, 1 to 6 percent slopes; Forelle loam, 1 to 6 percent slopes; Monbutte loam, 1 to 6 percent slopes; and Decross Variant, 1 to 8 percent slopes. Also included are Lupinto loam, 6 to 10 percent slopes, in an area between Pole Creek and the East Fork River and soils that are similar to the Lupinto soil but have slopes of 1 to 8 percent and are darker. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Typically, the surface layer of the Lupinto soil is brown loam 2 inches thick. The upper 7 inches of the subsoil is brown sandy clay loam. The next 14 inches is white sandy loam. The lower part to a depth of 60 inches or more is white very gravelly clay loam. In some areas the surface layer is gravelly loam or sandy clay loam.

Permeability is moderate. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

Most areas of this unit are used as rangeland and wildlife habitat. A few areas are used for irrigated hay and pasture.

The potential plant community on this unit is mainly 20 to 30 percent rhizomatous wheatgrasses, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, sedges and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear, annual grasses, and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

If this unit is used for irrigated hay and pasture, the main limitations are a short growing season and a gravelly surface in some areas. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Annual applications of nitrogen and phosphate fertilizer are needed to maintain the production of high-quality forage. Irrigation water can be applied by the contour ditch, border, furrow, or sprinkler method. Leveling helps to ensure a uniform application of water. To prevent overirrigation and the leaching of plant nutrients and to control water erosion, applications of irrigation water should be adjusted to the available water capacity and rate of water intake in the soil. Maintaining crop residue on or near the surface helps to control runoff and wind erosion and maintain tilth and the content of organic matter.

This unit is in capability subclasses IVc, nonirrigated, and IIIe, irrigated. It is in the Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site.

#### **171—Lymanson-Abston-Gelkie association, hilly.**

This map unit is on hills. Slopes are 1 to 30 percent. Areas are irregular in shape and are 40 to 600 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days. The Gelkie soil receives additional moisture in the form of runoff from melting snowdrifts.

This unit is about 45 percent Lymanson gravelly loam, 4 to 30 percent slopes; 20 percent Abston gravelly sandy loam, 1 to 8 percent slopes; and 15 percent Gelkie fine sandy loam, 2 to 8 percent slopes. The Lymanson soil is on back slopes and foot slopes, the Abston soil is on hillslopes, and the Gelkie soil is on the lee side slopes of hills.

Included in this unit are small areas of slick spots; Irigul channery loam, 3 to 30 percent slopes; and Pishkun Variant very gravelly loam, 6 to 25 percent slopes, on terrace escarpments. Also included are small areas of Hoodle very gravelly loam, 2 to 15 percent slopes, on terraces. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Lymanson soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, 20 percent of the surface is covered with gravel and channery fragments. The surface layer is yellowish brown gravelly loam 3 inches thick. The upper 4 inches of the subsoil is dark yellowish brown gravelly sandy clay loam. The next 6 inches is brown and yellowish

brown sandy clay loam. The lower 23 inches is very pale brown very fine sandy loam. Soft sandstone bedrock is at a depth of about 36 inches.

Permeability is moderate in the Lymanson soil. Available water capacity also is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Abston soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sodic shale interbedded with sandstone. Typically, the surface layer is pale brown gravelly sandy loam 3 inches thick. The upper 6 inches of the subsoil is brown, sodium-affected sandy clay. The lower 5 inches is light olive brown, sodium-affected sandy clay. The substratum is pale yellow sandy clay loam 14 inches thick. Sodic shale bedrock is at a depth of about 28 inches.

Permeability is slow in the Abston soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

The Gelkie soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone. Typically, the surface layer is brown fine sandy loam 4 inches thick. The upper 15 inches of the subsoil is brown sandy clay loam. The lower 11 inches is light brownish gray sandy clay loam. The substratum to a depth of 60 inches or more is very pale brown gravelly sandy clay loam.

Permeability is moderate in the Gelkie soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Lymanson soil is mainly 30 to 40 percent western wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Abston soil is mainly 10 to 25 percent western wheatgrass, 10 to 25 percent Indian ricegrass, 10 to 25 percent bottlebrush squirreltail, and 40 to 50 percent gardner saltbush. As the range condition deteriorates, birdfoot sagebrush, bottlebrush squirreltail, and Sandberg bluegrass

increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 650 pounds in favorable years to 300 pounds in unfavorable years.

The potential plant community on the Gelkie soil is mainly 25 to 35 percent rhizomatous wheatgrasses, 10 to 20 percent slender wheatgrass, 10 to 20 percent needlegrasses, and 5 to 10 percent big sagebrush. As the range condition deteriorates, big sagebrush and bluegrasses increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,200 pounds in favorable years to 1,200 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season, by droughtiness in the Lymanson soil, and by droughtiness and alkalinity in the Abston soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steepest areas. As a result, the less sloping areas tend to be overgrazed.

The Lymanson and Gelkie soils are in capability subclass VIe, nonirrigated. The Lymanson soil is in the Loamy, 10- to 14-inch precipitation, High Plains Southeast range site. The Gelkie soil is in the Loamy Overflow, 10- to 14-inch precipitation, High Plains Southeast range site. The Abston soil is in capability subclass VIi, nonirrigated. It is in the Saline Upland, 10- to 14-inch precipitation, High Plains Southeast range site.

**172—Lymanson-Conpeak association, rolling.** This map unit is on ridges, hills, and pediments. Slopes are 4 to 25 percent. Areas are irregular in shape and are 75 to 400 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 55 percent Lymanson very fine

sandy loam, 4 to 15 percent slopes, and 25 percent Conpeak fine sandy loam, 5 to 25 percent slopes. The Lymanson soil is on the side slopes of ridges and hills, and the Conpeak soil is on pediments and on the summit of ridges and hills.

Included in this unit are small areas of Hoodie very gravelly sandy loam, 2 to 10 percent slopes, on terraces; Cryluha gravelly fine sandy loam, 2 to 15 percent slopes; and a soil that is similar to the Lymanson soil but has slopes of 2 to 15 percent and is less than 20 inches deep over bedrock. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Lymanson soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from calcareous sandstone. Typically, 25 percent of the surface is covered with gravel. The surface layer is brown very fine sandy loam 2 inches thick. The upper part of the subsoil is brown sandy clay loam 21 inches thick. The lower part is light gray loam 7 inches thick. Soft sandstone bedrock is at a depth of about 30 inches.

Permeability is moderate in the Lymanson soil. Available water capacity also is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

The Conpeak soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from semiconsolidated sandstone. Typically, 30 percent of the surface is covered with semiconsolidated sandstone and siltstone gravel. The surface layer is light brownish gray fine sandy loam 2 inches thick. The subsoil is brown and light gray fine sandy loam 13 inches thick. Soft sandstone bedrock is at a depth of about 15 inches.

Permeability is moderate in the Conpeak soil. Available water capacity is low. The effective rooting depth is 8 to 20 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Lymanson soil is mainly 30 to 40 percent western wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, rabbitbrush and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in

favorable years to 600 pounds in unfavorable years.

The potential plant community on the Conpeak soil is mainly 15 to 25 percent bluebunch wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent Indian ricegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, Sandberg bluegrass, threadleaf sedge, and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season and by the restricted rooting depth and droughtiness in the Conpeak soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Lymanson soil is in capability subclass VIe, nonirrigated. It is in the Loamy, 10- to 14-inch precipitation, High Plains Southeast range site. The Conpeak soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**173—Midlight Variant-Winada Variant-Starman gravelly loams, steep.** This map unit is on mountains, ridges, and hills. Slopes are 10 to 50 percent. Areas are irregular in shape and are 40 to 640 acres in size. The native vegetation is mainly grasses and shrubs and scattered trees. Elevation is 7,400 to 9,000 feet. The annual precipitation is 15 to 19 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 40 percent Midlight Variant gravelly loam, 10 to 50 percent slopes; 30 percent Winada Variant gravelly loam, 10 to 50 percent slopes; and 15 percent Starman gravelly loam, 10 to 50 percent slopes. The Midlight Variant and Winada Variant soils are on mountainsides and ridges, and the Starman soil is on ridges and hills. The components of this unit occur

as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Cloud Peak gravelly loam, 10 to 30 percent slopes; Farlow gravelly clay loam, 10 to 30 percent slopes; Roxal sandy clay loam, 10 to 30 percent slopes; and Woosley loam, 10 to 30 percent slopes. Also included are small areas of Rock outcrop and small areas of a soil that is similar to the Winada Variant soil but is very deep and has slopes of 10 to 30 percent. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Mideligh Variant soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone or limestone. Typically, 30 percent of the surface is covered with gravel and channery fragments. The surface layer is brown gravelly loam 6 inches thick. The upper 7 inches of the subsoil is pale brown very gravelly loam. The lower 9 inches is very pale brown very gravelly sandy clay loam. Soft sandstone bedrock is at a depth of about 22 inches.

Permeability is moderate in the Mideligh Variant soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Winada Variant soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone or limestone. Typically, 35 percent of the surface is covered with gravel and channery fragments. The surface layer is dark brown gravelly loam 2 inches thick. The upper 6 inches of the subsoil is dark brown very gravelly sandy clay loam. The next 5 inches is light yellowish brown very gravelly sandy clay loam. The lower 13 inches is very pale brown very gravelly sandy clay loam. Soft sandstone bedrock is at a depth of about 26 inches.

Permeability is moderate in the Winada Variant soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Starman soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from sandstone or limestone. Typically, 35 percent of the surface is covered with angular gravel and channery fragments. The surface layer is brown gravelly loam 3 inches thick. The subsoil is light yellowish brown and pale yellow very gravelly loam 9 inches thick. Hard sandstone bedrock is at a depth of about 12 inches.

Permeability is moderate in the Starman soil. Available water capacity is low. The effective rooting

depth is 8 to 20 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Mideligh Variant and Winada Variant soils is mainly 25 to 40 percent bluebunch wheatgrass, 10 to 20 percent Idaho fescue, 5 to 10 percent Kingspike fescue, 5 to 10 percent rhizomatous wheatgrasses, 5 to 10 percent mountain muhly, and 5 to 10 percent big sagebrush. As the range condition deteriorates, threadleaf sedge and mat-forming forbs increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 650 pounds in favorable years to 400 pounds in unfavorable years.

The potential plant community on the Starman soil is mainly 10 to 25 percent Columbia needlegrass, 10 to 25 percent Idaho fescue, 10 to 25 percent Kingspike fescue, and 0 to 10 percent mountainmahogany. As the range condition deteriorates, big sagebrush and black sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 850 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by droughtiness, the content of rock fragments, and a short growing season and by the restricted rooting depth in the Starman soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

This unit is in capability subclass VII, nonirrigated. The Mideligh Variant and Winada Variant soils are in the Gravelly, 15- to 19-inch precipitation, Foothills and Mountains East range site. The Starman soil is in the Shallow Loamy, 15- to 19-inch precipitation, Foothills and Mountains East range site.

**174—Milren-Bosler-Rock River sandy loams, 1 to 12 percent slopes.** This map unit is on terraces and fan aprons. Areas are irregular in shape and are 100 to 1,200 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,500 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 45 percent Milren sandy loam, 1 to 8 percent slopes; 20 percent Bosler sandy loam, 1 to 8 percent slopes; and 15 percent Rock River sandy loam, 1 to 12 percent slopes. The Milren and Bosler soils are on terraces, and the Rock River soil is on fan aprons. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Blackhall fine sandy loam, 5 to 30 percent slopes, on hills; Cragosen gravelly loam, 5 to 45 percent slopes, on hills and escarpments; and Diamondville sandy clay loam, 1 to 15 percent slopes, on hillslopes and fan aprons. Also included are small areas of Milvar stony loam, 1 to 6 percent slopes, adjacent to the Milren soil. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Milren soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown sandy loam 2 inches thick. The subsurface layer is pale brown sandy loam 1 inch thick. The upper 8 inches of the subsoil is brown sandy clay. The next 5 inches is pale brown sandy clay loam. The lower 7 inches is very pale brown loam. The upper 33 inches of the substratum is very pale brown and pale brown fine sandy loam. The lower part to a depth of 60 inches or more is very pale brown loamy fine sand. In some areas the surface layer is loam or sandy clay loam.

Permeability is slow in the Milren soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Bosler soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, 15 percent of the surface is covered with gravel. The surface layer is yellowish brown sandy loam 2 inches thick. The upper 18 inches of the subsoil is dark yellowish brown sandy clay loam. The lower part to a depth of 60 inches or more is light gray very gravelly loamy sand. In some areas the surface layer is loam or sandy clay loam.

Permeability is moderate in the Bosler soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water

erosion is slight. The hazard of wind erosion is severe.

The Rock River soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown sandy loam 3 inches thick. The upper 12 inches of the subsoil is dark yellowish brown sandy clay loam. The lower 19 inches is pale brown sandy clay loam. The substratum to a depth of 60 inches or more also is pale brown sandy clay loam.

Permeability is moderate in the Rock River soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Milren soil is mainly 30 to 40 percent western wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Bosler and Rock River soils is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and silver sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more

desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, nonirrigated. The Milren soil is in the Loamy, 10- to 14-inch precipitation, High Plains Southeast range site. The Bosler and Rock River soils are in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**175—Milvar-Milren complex, 1 to 6 percent slopes.**

This map unit is on outwash plains, mountain toe slopes, terraces, and fan aprons. Areas are long and narrow and are 50 to 300 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,700 to 7,800 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 45 percent Milvar stony loam, 1 to 6 percent slopes, and 40 percent Milren fine sandy loam, 1 to 6 percent slopes. The Milvar soil is on outwash plains and mountain toe slopes, and the Milren soil is on fan aprons and terraces. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit, in small areas adjacent to the Milren soil, are Bosler sandy loam, 1 to 6 percent slopes; Brownsto loam, 1 to 6 percent slopes; and Rock River sandy loam, 1 to 6 percent slopes. Also included are small areas of Dahlquist very cobbly loam, 2 to 10 percent slopes, adjacent to the Milvar soil and small areas of Cragosen gravelly loam, 2 to 30 percent slopes, on terrace escarpments. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Milvar soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, 40 percent of the surface is covered with gravel, cobbles, and stones. The surface layer is brown stony loam 3 inches thick. The upper 13 inches of the subsoil is brown gravelly clay loam. The next 10 inches is very pale brown very gravelly loam. The lower part to a depth of 60 inches or more is pale brown very gravelly loamy sand.

Permeability is slow in the Milvar soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight.

The Milren soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown fine sandy loam 2 inches thick. The upper 14 inches of the subsoil is brown sandy clay. The lower 11 inches is very pale brown loam. The substratum to a depth of 60 inches or

more is light yellowish brown fine sandy loam. In some areas the surface layer is gravelly loam.

Permeability is slow in the Milren soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 30 to 40 percent western wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Because of the rock fragments on the surface of the Milvar soil, broadcasting is the best seeding method and aerial spraying and prescribed burning are the best methods of brush control. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Milvar soil is in capability subclass VI, nonirrigated. The Milren soil is in capability subclass IVe, nonirrigated. Both soils are in the Loamy, 10- to 14-inch precipitation, High Plains Southeast range site.

**176—Mosroc-Lymanson association, hilly.** This map unit is on mountain ridges, hillslopes, and foot slopes. Slopes are 1 to 30 percent. Areas are irregular in shape and are 40 to 600 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 50 percent Mosroc very gravelly fine sandy loam, 1 to 12 percent slopes, and 30 percent Lymanson gravelly loam, 4 to 30 percent slopes. The

Mosroc soil is on mountain ridges and hillslopes, and the Lymanson soil is on hillslopes and foot slopes.

Included in this unit are small areas of Irigul channery loam, 3 to 30 percent slopes, and Gelkie fine sandy loam, 2 to 30 percent slopes. Also included are small areas of Hoodle very gravelly loam, 1 to 15 percent slopes, on terraces and small areas of Midelight fine sandy loam, 1 to 15 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Mosroc soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from granite. Typically, 40 percent of the surface is covered with gravel, channery fragments, and stones. The surface layer is brown very gravelly fine sandy loam 2 inches thick. The subsoil is dark yellowish brown and dark brown very gravelly sandy clay loam 10 inches thick. The substratum is yellowish brown very gravelly sandy loam 6 inches thick. Granite bedrock is at a depth of about 18 inches.

Permeability is moderate in the Mosroc soil. Available water capacity is low. The effective rooting depth is 9 to 20 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of wind erosion also is slight.

The Lymanson soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, 15 percent of the surface is covered with gravel. The surface layer is brown gravelly loam 4 inches thick. The upper 10 inches of the subsoil is brown sandy clay loam. The lower 10 inches is very pale brown sandy clay loam. Soft sandstone bedrock is at a depth of about 24 inches.

Permeability is moderate in the Lymanson soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Mosroc soil is mainly 20 to 40 percent bluebunch wheatgrass, 5 to 15 percent Indian ricegrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 15 percent rhizomatous wheatgrasses. As the range condition deteriorates, big sagebrush, low rabbitbrush, and unpalatable forbs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Lymanson soil

is mainly 30 to 40 percent western wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season and by droughtiness, the restricted rooting depth, and the content of rock fragments in the Mosroc soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. The content of rock fragments in the Mosroc soil limits seeding to aerial broadcasting. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Mosroc soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Igneous, 10- to 14-inch precipitation, Foothills and Basins West range site. The Lymanson soil is in capability subclass VIe, nonirrigated. It is in the Loamy, 10- to 14-inch precipitation, High Plains Southeast range site.

**177—Oceanet-Rock outcrop-Persayo complex, hilly.** This map unit is on hills and ridges. Slopes are 6 to 45 percent. Areas are irregular in shape and are 40 to 600 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,200 to 6,500 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 115 to 130 days.

This unit is about 45 percent Oceanet sandy loam, 6 to 45 percent slopes; 20 percent Rock outcrop; and 20 percent Persayo loam, 6 to 45 percent slopes. The Oceanet and Persayo soils are on hills and ridges adjacent to exposures of sandstone and shale, and the Rock outcrop is on ridges, summits, and escarpments. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Birdsley sandy

clay loam, 1 to 15 percent slopes; Worland sandy loam, 2 to 35 percent slopes; and Saddle sandy loam, 1 to 12 percent slopes. Also included are small areas of Apron sandy loam, 1 to 10 percent slopes, and Lostwells sandy clay loam, 1 to 10 percent slopes, on fan aprons; Birdsley sandy clay loam, 1 to 15 percent slopes; and a soil that is similar to the Oceanet soil but is less than 10 inches deep over bedrock. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Oceanet soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is light olive brown sandy loam 4 inches thick. The underlying material is yellowish brown sandy loam 14 inches thick. Soft sandstone bedrock is at a depth of about 18 inches.

Permeability is moderately rapid in the Oceanet soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

The Rock outcrop occurs as exposures of sandstone and shale.

The Persayo soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from soft shale. Typically, the surface layer is light gray loam 2 inches thick. The underlying material is light brownish gray silt loam 11 inches thick. Soft shale bedrock is at a depth of about 13 inches.

Permeability is moderately slow in the Persayo soil. Available water capacity is low. The effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Oceanet soil is mainly 25 to 35 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 5 to 15 percent bluebunch wheatgrass, and 10 to 20 percent Indian ricegrass. As the range condition deteriorates, threadleaf sedge, blue grama, forbs, and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 250 pounds of air-dry vegetation per acre in normal years. Production ranges from 350 pounds in favorable years to 125 pounds in unfavorable years.

The potential plant community on the Persayo soil is mainly 20 to 30 percent rhizomatous wheatgrasses, 5 to 15 percent bottlebrush squirreltail, 5 to 15 percent Indian ricegrass, and 0 to 5 percent gardner saltbush.

As the range condition deteriorates, big sagebrush and birdfoot sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 250 pounds of air-dry vegetation per acre in normal years. Production ranges from 350 pounds in favorable years to 125 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, droughtiness, and the restricted rooting depth. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Oceanet and Persayo soils are in capability subclass VIIe, nonirrigated. The Oceanet soil is in the Shallow Sandy, 5- to 9-inch precipitation, Wind River Basin range site. The Persayo soil is in the Shallow Clayey, 5- to 9-inch precipitation, Wind River Basin range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site.

**178—Orpha-Vonalee complex, hilly.** This map unit is on sand dunes and hillslopes. Slopes are 1 to 40 percent. Areas are irregular in shape and are 200 to 600 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 6,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 45 to 49 degrees F, and the frost-free period is 120 to 130 days.

This unit is about 45 percent Orpha sand, 5 to 40 percent slopes, and 40 percent Vonalee loamy fine sand, 1 to 12 percent slopes. The Orpha soil is on sand dunes, and the Vonalee soil is on hillslopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Bowbac sandy loam, 1 to 15 percent slopes; Hiland sandy loam, 1 to 15 percent slopes; Taluce sandy loam, 5 to 20 percent slopes; and blowouts. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Orpha soil is very deep and excessively drained. It formed in sandy eolian material derived from various sources. Typically, the surface layer is pale brown sand 1 inch thick. The subsurface layer is yellowish brown

sand 4 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown sand.

Permeability is very rapid in the Orpha soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

The Vonalee soil is very deep and somewhat excessively drained. It formed in eolian deposits derived from various sources. Typically, the surface layer is brown loamy fine sand 4 inches thick. The upper 9 inches of the subsoil is yellowish brown fine sandy loam. The lower 7 inches is light yellowish brown loamy fine sand. The substratum to a depth of 60 inches or more is yellowish brown and very pale brown loamy fine sand.

Permeability is moderately rapid in the Vonalee soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Orpha soil is mainly 35 to 50 percent needleandthread, 15 to 25 percent Indian ricegrass, 10 to 20 percent thickspike wheatgrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and forbs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,700 pounds in favorable years to 900 pounds in unfavorable years.

The potential plant community on the Vonalee soil is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush and threadleaf sedge. As the range condition deteriorates, fringed sagewort and cudweed sagewort increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, droughtiness, and wind erosion. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing,

watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Orpha soil is in capability subclass VIe, nonirrigated. It is in the Sands, 10- to 14-inch precipitation, High Plains Southeast range site. The Vonalee soil is in capability subclass IVe, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**179—Owen Creek very stony clay loam, 2 to 15 percent slopes.** This moderately deep, well drained soil is on hillslopes and fan aprons. It formed in residuum and slope alluvium derived dominantly from shale interbedded with argillaceous sandstone. Areas are irregular in shape and are 40 to 1,500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,500 to 9,000 feet. The annual precipitation is 15 to 19 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

Included in this unit are small areas of Burnette loam, 3 to 10 percent slopes, and Rockinchair loam, 2 to 15 percent slopes, on hillslopes; Woosley loam, 2 to 15 percent slopes; and a shallow soil that has very gravelly underlying material and has slopes of 10 to 15 percent. Also included is a soil that is similar to the Owen Creek soil but has bedrock at a depth of more than 40 inches. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

Typically, 40 percent of the surface of the Owen Creek soil is covered with stones and channery fragments. The surface layer is grayish brown very stony clay loam 2 inches thick. The upper 9 inches of the subsoil is brown clay loam. The next 5 inches is grayish brown clay loam. The lower 13 inches is olive gray clay loam. The substratum also is olive gray clay loam. It is 10 inches thick. Soft shale bedrock is at a depth of about 39 inches.

Permeability is slow. Available water capacity is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of wind erosion also is slight.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly 10 to 25 percent Columbia needlegrass, 10 to 25 percent Idaho fescue, 5 to 10 percent Kingspike fescue, and 5 to 10 percent antelope bitterbrush. As the range condition deteriorates, Sandberg bluegrass and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 950 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,100 pounds in favorable years to 600 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by a short growing season and the content of rock fragments in the surface layer. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Conventional drilling methods are not practical because of the stones on the surface. Broadcasting is a suitable seeding method. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VI, nonirrigated. It is in the Coarse Upland, 15- to 19-inch precipitation, Foothills and Mountains East range site.

**180—Pensore-Rock outcrop complex, hilly.** This map unit is on hills and ridges. Slopes are 5 to 45 percent. Areas are irregular in shape and are 50 to 640 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,000 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 55 percent Pensore very channery loam, 5 to 45 percent slopes, and 35 percent Rock outcrop. The Pensore soil is on the side slopes of hills and ridges, and the Rock outcrop is on the summit of ridges and on escarpments. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Blackhall fine sandy loam, 5 to 45 percent slopes; Cragosen gravelly loam, 5 to 45 percent slopes; and Crago cobbly loam, 1 to 15 percent slopes. Also included are small areas of

Diamondville loam, 1 to 15 percent slopes, and Forelle loam, 1 to 15 percent slopes, on the side slopes of ridges and hills. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Pensore soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from limestone. Typically, 40 percent of the surface is covered with gravel and channery fragments. The surface layer is brown very channery loam 3 inches thick. The subsoil also is brown very channery loam. It is 8 inches thick. Hard limestone bedrock is at a depth of about 11 inches.

Permeability is moderate in the Pensore soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Rock outcrop occurs as exposures of limestone and fine grained, calcareous sandstone.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Pensore soil is mainly 20 to 35 percent bluebunch wheatgrass, 10 to 20 percent rhizomatous wheatgrasses, 5 to 15 percent needlegrasses, and 5 to 10 percent black sagebrush. As the range condition deteriorates, bluegrasses, sedges, and black sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 700 pounds in favorable years to 350 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, droughtiness, the content of rock fragments, a short growing season, and the restricted rooting depth. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Pensore soil is in capability subclass VII, nonirrigated. It is in the Shallow Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site.

**181—Persayo-Rock outcrop complex, hilly.** This map unit is on hills, ridges, and escarpments. Slopes are 3 to 45 percent. Areas are irregular in shape and are 40 to 640 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,800 to 6,500 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit is about 65 percent Persayo clay loam, 3 to 45 percent slopes, and 15 percent Rock outcrop. The Persayo soil is on the shoulder slopes and back slopes of hills and on the side slopes of ridges, and the Rock outcrop is on the summit of ridges and hills and on escarpments. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Birdsley sandy clay loam, 3 to 20 percent slopes; Oceanet sandy loam, 5 to 45 percent slopes; a reddish, shallow, loamy soil that has slopes of 3 to 20 percent; and Saddle sandy loam, 3 to 12 percent slopes. Also included are small areas of Lostwells sandy clay loam, 1 to 8 percent slopes, and Youngston clay loam, 1 to 6 percent slopes, on fan aprons. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Persayo soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from soft shale. Typically, the surface layer is light yellowish brown clay loam 3 inches thick. The underlying material is light olive brown clay loam 13 inches thick. Soft shale bedrock is at a depth of about 16 inches. In some areas 30 percent of the surface is covered with gravel.

Permeability is moderately slow in the Persayo soil. Available water capacity is low. The effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Rock outcrop occurs as exposures of shale interbedded with sandstone.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Persayo soil is mainly 20 to 30 percent rhizomatous wheatgrasses, 5 to 15 percent bottlebrush squirreltail, 5 to 15 percent Indian ricegrass, and 0 to 10 percent gardner saltbush. As the range condition deteriorates, big sagebrush and birdfoot sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 250 pounds of air-dry vegetation per acre in normal years. Production ranges from 350 pounds in favorable years to 125 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, the restricted rooting depth, and droughtiness. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion.

Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Persayo soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Clayey, 5- to 9-inch precipitation, Wind River Basin range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site.

**182—Pesmore-Rock outcrop-Asholler complex, steep.** This map unit is on ridges, hills, and mountains. Slopes are 8 to 60 percent. Areas are irregular in shape and are 40 to 600 acres in size. The native vegetation is mainly grasses and shrubs and a few scattered limber pine and juniper. Elevation is 6,300 to 8,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 50 percent Pesmore very channery sandy loam, 10 to 60 percent slopes; 15 percent Rock outcrop; and 15 percent Asholler channery loam, 8 to 30 percent slopes. The Pesmore soil is on the back slopes of hills and ridges and on mountainsides, the Rock outcrop is on escarpments, the summit of hills, and exhumed ridges, and the Asholler soil is on ridges and hills. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Chittum loam, 8 to 25 percent slopes, adjacent to the Asholler soil; Dahlquist very cobbly loam, 8 to 25 percent slopes; and Gelkie loam, 8 to 25 percent slopes. The Gelkie soil is in areas of valley fill at the base of hillslopes, adjacent to the Pesmore soil. Also included, in the area south of Beaver Rim, adjacent to the Pesmore soil, are small areas of Bosler fine sandy loam on fan aprons; Blackhall fine sandy loam, 5 to 45 percent slopes; Cragosen sandy clay loam, 5 to 40 percent slopes; and, in the Owl Hill area, a very cobbly soil that has a dark surface layer and has slopes of 8 to 25 percent. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Pesmores soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from schist and gneiss. Typically, the surface layer is dark grayish brown very channery sandy loam 3 inches thick. The upper 7 inches of the subsoil is brown very channery loam. The lower 14 inches is light brownish gray and olive very channery loam. Hard schist bedrock is at a depth of about 24 inches. In some areas the surface layer is gravelly loam, very gravelly loam, or stony loam.

Permeability is moderate in the Pesmores soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Rock outcrop occurs as exposures of schist, gneiss, and granite.

The Asholler soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from schist and gneiss. Typically, the surface layer is brown channery loam 3 inches thick. The upper 8 inches of the underlying material is yellowish brown very channery loam. The lower 6 inches is yellowish brown very channery sandy clay loam. Hard schist bedrock is at a depth of about 17 inches.

Permeability is moderate in the Asholler soil. Available water capacity is low. The effective rooting depth is 6 to 20 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Pesmores soil is mainly 40 to 50 percent bluebunch wheatgrass, 5 to 10 percent Indian ricegrass, 5 to 10 percent needleandthread, and 5 to 10 percent perennial forbs. As the range condition deteriorates, sedges and woody plants increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 450 pounds of air-dry vegetation per acre in normal years. Production ranges from 650 pounds in favorable years to 300 pounds in unfavorable years.

The potential plant community on the Asholler soil is mainly 20 to 40 percent bluebunch wheatgrass, 5 to 15 percent Indian ricegrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 15 percent rhizomatous wheatgrasses. As the range condition deteriorates, big sagebrush, low rabbitbrush, and unpalatable forbs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years.

Production ranges from 1,000 pounds in favorable years to 600 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by a short growing season, low precipitation, the content of rock fragments, and droughtiness and by the restricted rooting depth in the Asholler soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Pesmores and Asholler soils are in capability subclass VII<sub>s</sub>, nonirrigated. The Pesmores soil is in the Gravelly, 10- to 14-inch precipitation, High Plains Southeast range site. The Asholler soil is in the Shallow Loamy, 10- to 14-inch precipitation, High Plains Southeast range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site.

### **183—Peyton sandy loam, 1 to 10 percent slopes.**

This very deep, well drained soil is on fan aprons and valley side slopes. It formed in noncalcareous alluvium derived from various sources. Areas are long and narrow and are 10 to 100 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,000 feet. The annual precipitation is 13 to 16 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days. The soil receives additional moisture from melting snowdrifts.

Included in this unit are small areas of Havre loam, 0 to 3 percent slopes; a moderately well drained, loamy soil that has a thick, dark surface layer, has slopes of 1 to 6 percent, and is adjacent to drainageways; and a clayey soil that has a thick, dark surface layer and has slopes of 3 to 10 percent. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

Typically, the surface layer of the Peyton soil is brown sandy loam 2 inches thick. The upper part of the subsoil is brown sandy clay loam 13 inches thick. The lower part is light yellowish brown sandy clay loam 7 inches thick. The upper 8 inches of the substratum is light yellowish brown coarse sandy loam. The lower part to a depth of 60 inches or more is light yellowish brown loamy sand.

Permeability is moderate. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water

erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 25 to 35 percent rhizomatous wheatgrasses, 10 to 20 percent slender wheatgrass, 10 to 20 percent needlegrasses, and 5 to 10 percent big sagebrush. As the range condition deteriorates, big sagebrush and bluegrasses increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,200 pounds in favorable years to 1,200 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, nonirrigated. It is in the Loamy Overflow, 10- to 14-inch precipitation, High Plains Southeast range site.

**184—Pishkun Variant-Hoodle complex, hilly.** This map unit is on terraces and terrace escarpments. Slopes are 3 to 25 percent. Areas are irregular in shape and are 40 to 1,000 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 55 percent Pishkun Variant very gravelly loam, 3 to 25 percent slopes, and 25 percent Hoodle very gravelly sandy loam, 3 to 15 percent slopes. The Pishkun Variant soil is on terrace escarpments, and the Hoodle soil is on terraces. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit, on hillslopes, are small areas of Irigul channery loam, 3 to 25 percent slopes; Lymanson gravelly sandy loam, 4 to 25 percent slopes; and Mideligh channery loam, 3 to 15 percent slopes. Also

included are small areas of Gelkie fine sandy loam, 3 to 25 percent slopes, on terraces and a moderately deep, clayey, alkaline soil that has slopes of 3 to 12 percent and is on hillslopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Pishkun Variant soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, 45 percent of the surface is covered with gravel and stones. The surface layer is brown very gravelly loam 3 inches thick. The upper 6 inches of the subsoil is very pale brown very gravelly loam. The next 6 inches is very pale brown very gravelly sandy loam. The lower part to a depth of 60 inches or more is white and light gray very gravelly sandy loam.

Permeability is moderately rapid in the Pishkun Variant soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

The Hoodle soil is very deep and well drained. It formed in alluvium derived dominantly from schist and granite. Typically, 35 percent of the surface is covered with gravel and channery fragments. The surface layer is brown very gravelly sandy loam 3 inches thick. The upper 11 inches of the subsoil is dark yellowish brown very gravelly sandy clay loam. The lower 13 inches is light brownish gray very gravelly sandy loam. The substratum to a depth of 60 inches or more is pale brown very gravelly loamy sand.

Permeability is moderate in the Hoodle soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight. The hazard of wind erosion also is slight.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 40 to 50 percent bluebunch wheatgrass, 5 to 10 percent Indian ricegrass, 5 to 10 percent needleandthread, and 5 to 10 percent perennial forbs. As the range condition deteriorates, sedges and shrubs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 450 pounds of air-dry vegetation per acre in normal years. Production ranges from 650 pounds in favorable years to 300 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, a short growing season, the content of rock fragments, and droughtiness. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management

practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VII, nonirrigated. It is in the Gravelly, 10- to 14-inch precipitation, High Plains Southeast range site.

**185—Poposhia loam, 1 to 6 percent slopes.** This very deep, well drained soil is on fan aprons and toe slopes. It formed in alluvium derived from various sources. Areas are irregular in shape and are 5 to 160 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,800 to 7,300 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

Included in this unit are small areas of Almy loam, 1 to 6 percent slopes; Forelle loam, 1 to 6 percent slopes; Rock River loam, 1 to 6 percent slopes; Sinkson loam, 1 to 6 percent slopes; and Brownsto loam, 1 to 6 percent slopes. Also included, in the Eastfork area, are small areas of Brownsto loam, 6 to 10 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Typically, the surface layer of the Poposhia soil is pale brown loam 7 inches thick. The subsoil also is pale brown loam. It is 11 inches thick. The substratum to a depth of 60 inches or more is very pale brown loam. In some areas the surface layer is sandy clay loam.

Permeability is moderate. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly for irrigated hay and pasture. A few areas are used as rangeland and wildlife habitat.

This unit is well suited to irrigated hay and pasture. The main limitations are the slope and a short growing season. Applications of nitrogen and phosphate fertilizer improve the growth of forage plants. Proper grazing practices, rotation grazing, weed control, and applications of fertilizer are needed to ensure the maximum quality of forage. Periodic mowing and clipping help to maintain a uniform plant cover and discourage selective grazing. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

Irrigation water can be applied by the contour ditch, furrow, or sprinkler method. To prevent overirrigation and the leaching of plant nutrients and to control water erosion, applications of irrigation water should be adjusted to the available water capacity and rate of water intake in the soil. Leveling helps to ensure a uniform application of water.

The potential plant community on this unit is mainly 20 to 30 percent rhizomatous wheatgrasses, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, sedges and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site. It is prime farmland in areas where it is irrigated and an adequate water supply is available.

**186—Poposhia-Blazon-Carmody complex, hilly.**

This map unit is on hills, ridges, and fan aprons. Slopes are 3 to 40 percent. Areas are irregular in shape and are 20 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 7,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 35 percent Poposhia loam, 3 to 20 percent slopes; 30 percent Blazon clay loam, 6 to 40 percent slopes; and 15 percent Carmody fine sandy loam, 3 to 25 percent slopes. The Poposhia soil is on fan aprons, and the Blazon and Carmody soils are on hills and ridges. The components of this unit occur as

areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Blackhall sandy loam, 5 to 40 percent slopes; Diamondville loam, 3 to 15 percent slopes; Forelle loam, 3 to 20 percent slopes; and Cushool sandy loam, 3 to 20 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Poposhia soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is yellowish brown loam 3 inches thick. The subsoil is light olive brown loam 7 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown clay loam.

Permeability is moderate in the Poposhia soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Blazon soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from soft shale. Typically, the surface layer is dark yellowish brown clay loam 4 inches thick. The underlying material is yellowish brown and light olive brown clay loam 13 inches thick. Soft shale bedrock is at a depth of about 17 inches.

Permeability is moderately slow in the Blazon soil. Available water capacity is low. The effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Carmody soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is brown fine sandy loam 5 inches thick. The underlying material is light yellowish brown fine sandy loam 23 inches thick. Soft sandstone bedrock is at a depth of about 28 inches.

Permeability is moderate in the Carmody soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Poposhia soil is mainly 30 to 40 percent western wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, rabbitbrush and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces

about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Blazon soil is mainly 20 to 40 percent rhizomatous wheatgrasses, 5 to 15 percent bluebunch wheatgrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 10 percent winterfat. As the range condition deteriorates, bluegrasses and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Carmody soil is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, threadleaf sedge and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and by the restricted rooting depth and droughtiness in the Blazon and Carmody soils. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, prescribed burning, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Poposhia and Carmody soils are in capability subclass VIe, nonirrigated. The Poposhia soil is in the Loamy, 10- to 14-inch precipitation, High Plains Southeast range site. The Carmody soil is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site. The Blazon soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Clayey, 10- to 14-inch precipitation, High Plains Southeast range site.

**187—Poposhia, sodic-Blazon complex, rolling.** This map unit is on fan aprons, hills, and ridges. Slopes are 2 to 15 percent. Areas are irregular in shape and are 40 to 100 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,500 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 55 percent Poposhia loam, sodic, 2 to 10 percent slopes, and 30 percent Blazon clay loam, 3 to 15 percent slopes. The Poposhia soil is on fan aprons, and the Blazon soil is on hillslopes and ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Absher loam, 1 to 8 percent slopes, and small areas of Rock outcrop on escarpments, ridges, and knobs adjacent to the Blazon soil. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Poposhia soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is yellowish brown loam 2 inches thick. The upper 25 inches of the underlying material is light olive brown, sodium-affected clay loam. The lower part to a depth of 60 inches or more is light olive brown loam.

Permeability is moderately slow in the Poposhia soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

The Blazon soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from soft shale. Typically, the surface layer is light brownish gray clay loam 1 inch thick. The underlying material is light olive brown clay loam 18 inches thick. Soft shale bedrock is at a depth of about 19 inches.

Permeability is moderately slow in the Blazon soil. Available water capacity is low. The effective rooting depth is 4 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Poposhia soil is mainly 40 to 50 percent gardner saltbush, 10 to 20 percent western wheatgrass, 10 to 20 percent bottlebrush squirreltail, and 10 to 20 percent Indian ricegrass. As the range condition deteriorates, bottlebrush squirreltail, Sandberg bluegrass, and birdfoot sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and

weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 650 pounds in favorable years to 300 pounds in unfavorable years.

The potential plant community on the Blazon soil is mainly 20 to 40 percent rhizomatous wheatgrasses, 5 to 15 percent bluebunch wheatgrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 10 percent winterfat. As the range condition deteriorates, bluegrass and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season, by the content of sodium in the Poposhia soil, and by droughtiness and the restricted rooting depth in the Blazon soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Poposhia soil is in capability subclass VI<sub>s</sub>, nonirrigated. It is in the Saline Upland, 10- to 14-inch precipitation, High Plains Southeast range site. The Blazon soil is in capability subclass VII<sub>e</sub>, nonirrigated. It is in the Shallow Clayey, 10- to 14-inch precipitation, High Plains Southeast range site.

**188—Quander-Youga-Onason complex, steep.** This map unit is on mountains, foot slopes, and ridges. Slopes are 10 to 45 percent. Areas are irregular in shape and are 40 to 600 acres in size. The native vegetation is mainly grasses, shrubs, and scattered limber pine. Elevation is 7,000 to 9,000 feet. The annual precipitation is 15 to 19 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 45 percent Quander cobbly loam, 25 to 45 percent slopes; 25 percent Youga loam, 10 to 25 percent slopes; and 15 percent Onason sandy loam, 10 to 45 percent slopes. The Quander soil is on mountain back slopes, the Youga soil is on foot slopes,

and the droughty Onason soil is on the summit of ridges and on shoulder slopes at the lower, warmer elevations. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Ansel sandy loam, 10 to 45 percent slopes, and Granile gravelly sandy loam, 5 to 30 percent slopes. Also included are small areas of Peyton sandy loam, 1 to 10 percent slopes, on fan aprons and small areas of a soil that is similar to the Youga soil but is moderately deep. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Quander soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, 35 percent of the surface is covered with gravel, cobbles, and stones. The surface layer is grayish brown cobbly loam 3 inches thick. The upper 7 inches of the subsoil is brown very cobbly sandy clay loam. The lower 6 inches is yellowish brown very cobbly sandy clay loam. The substratum to a depth of 60 inches or more is yellowish brown and brownish yellow very cobbly sandy clay loam. In some areas the surface layer is stony loam.

Permeability is moderate in the Quander soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Youga soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is dark gray loam 3 inches thick. The upper 4 inches of the subsoil is grayish brown loam. The lower 21 inches is brown and yellowish brown sandy clay loam. The substratum to a depth of 60 inches or more is yellowish brown sandy clay loam.

Permeability is moderate in the Youga soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Onason soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, 15 percent of the surface is covered with gravel. The surface layer is pale brown sandy loam 3 inches thick. The underlying material is brown sandy loam 8 inches thick. Soft sandstone bedrock is at a depth of about 11 inches.

Permeability is moderately rapid in the Onason soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the

hazard of water erosion is severe. The hazard of wind erosion also is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Quander soil is mainly 20 to 30 percent bluebunch wheatgrass, 10 to 20 percent Idaho fescue, 5 to 10 percent western wheatgrass, and 5 percent big sagebrush. As the range condition deteriorates, threadleaf sedge and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,700 pounds in favorable years to 800 pounds in unfavorable years.

The potential plant community on the Youga soil is mainly 10 to 20 percent bluebunch wheatgrass, 5 to 10 percent Griffith wheatgrass, 10 to 20 percent Idaho fescue, 5 to 10 percent prairie junegrass, and 5 percent big sagebrush. As the range condition deteriorates, threadleaf sedge, big sagebrush, and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,000 pounds in favorable years to 800 pounds in unfavorable years.

The potential plant community on the Onason soil is mainly 15 to 25 percent bluebunch wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent Indian ricegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, threadleaf sedge, Sandberg bluegrass, and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by a short growing season, by the content of rock fragments in the Quander soil, and by droughtiness, the restricted rooting depth, and wind erosion in areas of the Onason soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the

amount of desirable vegetation is not sufficient for natural seeding to occur. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Quander and Youga soils are in capability subclass VIe, nonirrigated. The Quander soil is in the Coarse Upland, 15- to 19-inch precipitation, Foothills and Mountains Southeast range site. The Youga soil is in the Loamy, 15- to 19-inch precipitation, Foothills and Mountains Southeast range site. The Onason soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**189—Rallod-Rock outcrop-Seaverson complex, hilly.** This map unit is on hills, ridges, and escarpments. Slopes are 3 to 40 percent. Areas are irregular in shape and are 40 to 1,000 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 6,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 45 percent Rallod loam, 3 to 25 percent slopes; 20 percent Rock outcrop; and 20 percent Seaverson loam, 6 to 40 percent slopes. The Rallod and Seaverson soils are on hills and ridges, and the Rock outcrop is on the summit of hills and ridges and on escarpments. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of slick spots and Blazon clay loam, 3 to 40 percent slopes. Also included are small areas of Almy loam, 1 to 10 percent slopes, and Monbutte fine sandy loam, 1 to 10 percent slopes, on fan aprons. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Rallod soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from variegated shale. Typically, the surface layer is brown loam 2 inches thick. The upper 11 inches of the subsoil is dark reddish brown and reddish brown, sodium-affected clay loam. The lower 5 inches is pinkish gray clay loam. Soft, variegated shale bedrock is at a depth of about 18 inches.

Permeability is slow in the Rallod soil. Available water capacity is low. The effective rooting depth is 9 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Rock outcrop occurs as exposures of soft, variegated, sodic shale.

The Seaverson soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from variegated, sodic shale. Typically, the surface layer is pinkish gray loam 2 inches thick. The subsoil is reddish brown, sodium-affected clay loam 5 inches thick. The substratum is light gray, sodium-affected loam 4 inches thick. Soft, variegated, sodic shale bedrock is at a depth of about 11 inches.

Permeability is very slow in the Seaverson soil. Available water capacity is low. The effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 20 to 40 percent rhizomatous wheatgrasses, 5 to 15 percent bluebunch wheatgrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 10 percent winterfat. As the range condition deteriorates, Sandberg bluegrass and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, the restricted rooting depth, droughtiness, alkalinity, and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Rallod and Seaverson soils are in capability subclass VIIe, nonirrigated. They are in the Shallow Clayey, 10- to 14-inch precipitation, High Plains Southeast range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site.

**190—Relsob-Bluerim sandy loams, 1 to 10 percent slopes.** This map unit is on fan aprons and hills. Areas are long and narrow and are 20 to 150 acres in size.

The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 55 percent Relsob sandy loam, 1 to 6 percent slopes, and 30 percent Bluerim sandy loam, 3 to 10 percent slopes. The Relsob soil is on fan aprons and toe slopes, and the Bluerim soil is on hillslopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Bosler fine sandy loam, 1 to 8 percent slopes, and Ryark sandy loam, 1 to 10 percent slopes, adjacent to the Relsob soil. Also included are small areas of Onason gravelly sandy loam, 5 to 15 percent slopes, and Cragosen gravelly loam, 3 to 15 percent slopes, adjacent to the Bluerim soil. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Relsob soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone. Typically, the surface layer is brown sandy loam 3 inches thick. The upper 9 inches of the subsoil is yellowish brown sandy clay loam. The lower 3 inches is light yellowish brown gravelly sandy clay loam. The substratum to a depth of 60 inches or more is light yellowish brown very gravelly loamy sand.

Permeability is moderate in the Relsob soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Bluerim soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is brown sandy loam 2 inches thick. The subsoil is yellowish brown sandy clay loam 14 inches thick. The substratum is light yellowish brown sandy loam 19 inches thick. Soft sandstone bedrock is at a depth of about 35 inches.

Permeability is moderate in the Bluerim soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and silver sagebrush increase in abundance. As the range

condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by droughtiness, low precipitation, and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**191—Rentsac-Carmody complex, hilly.** This map unit is on ridges and hills. Slopes are 2 to 40 percent. Areas are irregular in shape and are 30 to 200 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,000 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 50 percent Rentsac very gravelly loam, 6 to 40 percent slopes, and 30 percent Carmody fine sandy loam, 2 to 40 percent slopes. The Rentsac soil is on ridges, and the Carmody soil is on ridges, hillslopes, and knobs. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Blackhall fine sandy loam, 5 to 45 percent slopes, and Pensore very channery loam, 5 to 45 percent slopes, adjacent to the Rentsac soil. Also included are small areas of Rock outcrop; small areas of Diamondville loam, 2 to 15 percent slopes, on fan aprons; Forelle loam, 1 to 15 percent slopes; Luhon fine sandy loam, 1 to 10 percent slopes; Rock River loam, 1 to 8 percent slopes; and Cushool loam, 2 to 25 percent slopes. Included areas make up about 20 percent of the total acreage. The

percentage varies from one area to another.

The Rentsac soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, 30 percent of the surface is covered with gravel and cobbles. The surface layer is pale brown very gravelly loam 5 inches thick. The underlying material is light gray very gravelly loam 9 inches thick. Hard sandstone bedrock is at a depth of about 14 inches.

Permeability is moderate in the Rentsac soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Carmody soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, 10 percent of the surface is covered with gravel and cobbles. The surface layer is brown fine sandy loam 4 inches thick. The upper 28 inches of the underlying material also is brown fine sandy loam. The lower 7 inches is very pale brown fine sandy loam. Soft sandstone bedrock is at a depth of about 39 inches.

Permeability is moderate in the Carmody soil. Available water capacity also is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Rentsac soil is mainly 15 to 25 percent bluebunch wheatgrass, 15 to 25 percent western wheatgrass, 5 to 10 percent mutton bluegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, threadleaf sedge and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Carmody soil is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and silver sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is

limited by low precipitation, a short growing season, and droughtiness and by the content of rock fragments in the Rentsac soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion.

Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Broadcasting is a suitable method of seeding. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Rentsac soil is in capability subclass VIIc, nonirrigated. It is in the Shallow Loamy, 10- to 14-inch precipitation, High Plains Southeast range site. The Carmody soil is in capability subclass VIe, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**192—Riverwash-Aquic Ustifluents complex, nearly level.** This map unit is on braided stream channels and flood plains. Slopes are 0 to 3 percent. Areas are long and narrow and are 10 to 300 acres in size. The native vegetation is mainly willows, cottonwood trees, and grasses. Elevation is 6,000 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 80 to 115 days.

This unit is about 60 percent Riverwash and 30 percent Aquic Ustifluents, 0 to 3 percent slopes. The Riverwash is in stream channels, and the Aquic Ustifluents are on flood plains. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Countryman loam, 0 to 3 percent slopes; Haplaquolls, 0 to 3 percent slopes; Lander loam, 0 to 3 percent slopes; and Lander Variant loam, 0 to 3 percent slopes, adjacent to the Aquic Ustifluents. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Riverwash occurs as areas of sandy, silty, or gravelly sediment. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation. They are annually flooded for very long periods. The flooding can occur at any time throughout the year. The water table is at the same level as the streams.

The Aquic Ustifluents are very deep and somewhat poorly drained. They formed in recent alluvium derived from various sources. They vary considerably within short distances. Typically, the surface layer is brown or pale brown loamy sand, sandy loam, or loam 4 inches thick. The underlying material to a depth of 60 inches or more is pale brown or very pale brown very gravelly loamy sand, gravelly sandy loam, loamy sand, sandy loam, or loam.

Permeability is moderate to rapid in the Aquic Ustifluents. Available water capacity is very low to high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight. These soils are frequently flooded for brief periods from May through August. The water table is at a depth of 1.5 to 3.5 feet throughout the year.

This unit is used mainly for wildlife habitat. It also is used as rangeland.

The Riverwash does not have a permanent plant cover because of the annual flooding.

The potential plant community on the Aquic Ustifluents is mainly 15 to 30 percent basin wildrye, 5 to 15 percent slender wheatgrass, 5 to 15 percent rhizomatous wheatgrasses, and 5 to 15 percent cottonwood trees. As the range condition deteriorates, cottonwood, silver buffaloberry, big sagebrush, and other shrubs increase in abundance. As the range condition further deteriorates, Kentucky bluegrass and annual grasses and weeds invade. The potential plant community produces about 2,300 pounds of air-dry vegetation per acre in normal years. Production ranges from 3,000 pounds in favorable years to 1,600 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by the flooding and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, fencing, and critical area planting. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur.

The Riverwash is in capability subclass VIw, nonirrigated. It is not assigned to a range site. The Aquic Ustifluents are in capability subclass IVw, nonirrigated. They are in the Lowlands, 10- to 14-inch precipitation, Foothills and Basins East range site.

**193—Rockinchair-Rock outcrop-Sinkson complex, hilly.** This map unit is on hills, ridges, and fan aprons. Slopes are 2 to 40 percent. Areas are irregular in shape and are 100 to 1,200 acres in size. The native

vegetation is mainly grasses and shrubs. Elevation is 6,500 to 8,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 40 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 55 percent Rockinchair fine sandy loam, 2 to 40 percent slopes; 15 percent Rock outcrop; and 15 percent Sinkson loam, 2 to 10 percent slopes. The Rockinchair soil is on the summit, shoulder slopes, and back slopes of hills and ridges, the Rock outcrop is on escarpments and on the summit of hills and ridges, and the Sinkson soil is on fan aprons. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Almy loam, 0 to 10 percent slopes; Forelle loam, 1 to 15 percent slopes; Luhon loam, 1 to 10 percent slopes; and Brownsto sandy loam, 1 to 20 percent slopes, adjacent to the Sinkson soil. Also included are small areas of a reddish, very gravelly, shallow soil that has slopes of 3 to 40 percent and is adjacent to the Rockinchair soil. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Rockinchair soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from variegated shale interbedded with sandstone. Typically, the surface layer is yellowish brown fine sandy loam 4 inches thick. The upper part of the subsoil is pale brown sandy clay loam 14 inches thick. The lower part is light yellowish brown sandy clay loam 14 inches thick. Variegated, soft shale bedrock is at a depth of about 32 inches.

Permeability is moderate in the Rockinchair soil. Available water capacity also is moderate. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

The Rock outcrop occurs as exposures of variegated shale interbedded with sandstone.

The Sinkson soil is very deep and well drained. It formed in mixed alluvium derived dominantly from sandstone and siltstone. Typically, the surface layer is yellowish red loam 6 inches thick. The underlying material to a depth of 60 inches or more is reddish brown loam.

Permeability is moderate in the Sinkson soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Rockinchair soil

is mainly 20 to 35 percent bluebunch wheatgrass, 10 to 20 percent rhizomatous wheatgrasses, 5 to 15 percent needlegrasses, and 5 to 10 percent black sagebrush. As the range condition deteriorates, bluegrasses, sedges, and black sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 700 pounds in favorable years to 350 pounds in unfavorable years.

The potential plant community on the Sinkson soil is mainly 20 to 30 percent rhizomatous wheatgrasses, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, sedges and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Rockinchair soil is in capability subclass VIe, nonirrigated. It is in the Shallow Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site. The Sinkson soil is in capability subclass IVe, nonirrigated. It is in the Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site.

**194—Rockinchair-Sinkson loams, 1 to 15 percent slopes.** This map unit is on hills, ridges, and fan aprons. Areas are irregular in shape and are 100 to 1,000 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,500 to 8,000 feet.

The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 40 percent Rockinchair loam, 1 to 15 percent slopes, and 40 percent Sinkson loam, 1 to 8 percent slopes. The Rockinchair soil is on ridges and hillslopes, and the Sinkson soil is on fan aprons. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Absher loam, 1 to 8 percent slopes; Forelle loam, 1 to 15 percent slopes; Luhon loam, 1 to 10 percent slopes; and Almy very fine sandy loam, 1 to 10 percent slopes, adjacent to the Sinkson soil. Also included are small areas of Brownsto sandy loam, 1 to 15 percent slopes, and Thermopolis loam, 2 to 15 percent slopes, adjacent to the Rockinchair soil. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Rockinchair soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from variegated shale interbedded with sandstone. Typically, the surface layer is reddish brown loam 3 inches thick. The upper 5 inches of the subsoil is brown loam. The next 11 inches is reddish brown loam. The lower 15 inches is light brownish gray clay loam. Variegated, soft shale bedrock is at a depth of about 34 inches.

Permeability is moderate in the Rockinchair soil. Available water capacity also is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Sinkson soil is very deep and well drained. It formed in mixed alluvium derived dominantly from sandstone and siltstone. Typically, the surface layer is brown loam 5 inches thick. The upper 30 inches of the underlying material is light brown clay loam. The lower part to a depth of 60 inches or more is light reddish brown clay loam.

Permeability is moderate in the Sinkson soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Rockinchair soil is mainly 20 to 35 percent bluebunch wheatgrass, 10 to 20 percent rhizomatous wheatgrasses, 5 to 15 percent needlegrasses, and 5 to 10 percent black sagebrush. As the range condition deteriorates, bluegrasses, sedges, and black sagebrush increase in abundance.

As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 700 pounds in favorable years to 350 pounds in unfavorable years.

The potential plant community on the Sinkson soil is mainly 20 to 30 percent rhizomatous wheatgrasses, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, sedges and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, nonirrigated. The Rockinchair soil is in the Shallow Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site. The Sinkson soil is in the Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site.

**195—Rock outcrop-Asholler complex, steep.** This map unit is on exhumed knobs and on ridges, hills, and mountains. Slopes are 10 to 60 percent. Areas are irregular in shape and are 40 to 1,000 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,300 to 8,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 45 percent Rock outcrop and 40 percent Asholler very channery loam, 10 to 60 percent slopes. The Rock outcrop is on knobs, ridges, hills, and mountains, and the Asholler soil is on hills, ridges, and mountains. The components of this unit occur as areas so intricately intermingled that mapping them separately

was not practical at the scale used.

Included in this unit are small areas of Cushool sandy loam, 5 to 20 percent slopes; Pesmore very channery sandy loam, 10 to 40 percent slopes; and a soil that is similar to the Asholler soil but has a dark surface layer and a subsoil of very gravelly sandy clay loam. Also included are small areas of a loamy soil that is shallow over soft bedrock and has slopes of 5 to 45 percent and small areas of Zeomont loamy sand, 5 to 35 percent slopes, south of Beaver Rim. Included areas make up about 15 percent of the total acreage.

The Rock outcrop occurs as exposures of granite and schist.

The Asholler soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from schist. Typically, the surface layer is grayish brown very channery loam 3 inches thick. The underlying material is brown very channery loam 11 inches thick. Hard schist bedrock is at a depth of about 14 inches.

Permeability is moderate in the Asholler soil. Available water capacity is low. The effective rooting depth is 6 to 20 inches. Runoff is rapid, the hazard of water erosion is high. The hazard of wind erosion is slight.

This unit is used for wildlife habitat.

The potential plant community on the Asholler soil is mainly 20 to 40 percent bluebunch wheatgrass, 5 to 15 percent Indian ricegrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 15 percent rhizomatous wheatgrasses. As the range condition deteriorates, big sagebrush, low rabbitbrush, and unpalatable forbs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 600 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by a short growing season, the restricted rooting depth, droughtiness, low precipitation, and the content of rock fragments. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Broadcasting is a suitable method of seeding. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Rock outcrop is in capability class VIII,

nonirrigated. It is not assigned to a range site. The Asholler soil is in capability subclass VIIc, nonirrigated. It is in the Shallow Loamy, 10- to 14-inch precipitation, High Plains Southeast range site.

**196—Rock outcrop-Blackhall complex, hilly.** This map unit is on hills, ridges, knobs, and escarpments. Slopes are 5 to 45 percent. Areas are irregular in shape and are 40 to 320 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,500 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 40 percent Rock outcrop and 40 percent Blackhall sandy loam, 5 to 45 percent slopes. The Rock outcrop is on the summit of hills and ridges and on escarpments, and the Blackhall soil is on hillslopes, on the sides of ridges, and on knobs. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Blazon clay loam, 6 to 30 percent slopes; Carmody fine sandy loam, 5 to 40 percent slopes; Cragosen gravelly loam, 5 to 45 percent slopes; and Rentsac very gravelly loam, 6 to 40 percent slopes. Also included are small areas of the very shallow Blazon clay loam, 5 to 40 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Rock outcrop occurs as exposures of soft sandstone.

The Blackhall soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is pale brown sandy loam 2 inches thick. The subsoil is yellowish brown and very pale brown sandy loam 16 inches thick. Soft sandstone bedrock is at a depth of about 18 inches.

Permeability is moderate in the Blackhall soil. Available water capacity is low. The effective rooting depth is 6 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

This unit is used mainly for wildlife habitat.

The potential plant community on the Blackhall soil is mainly 15 to 25 percent bluebunch wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent Indian ricegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, Sandberg bluegrass, threadleaf sedge, and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 900 pounds of air-dry

vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, the restricted rooting depth, droughtiness, and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Aerial broadcasting is a suitable method of seeding. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site. The Blackhall soil is in capability subclass VIIc, nonirrigated. It is in the Shallow Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**197—Rock outcrop-Blazon complex, hilly.** This map unit is on hills, ridges, and knobs. Slopes are 6 to 40 percent. Areas are irregular in shape and are 40 to 320 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 50 percent Rock outcrop and 30 percent Blazon clay loam, 6 to 40 percent slopes. The Rock outcrop is on the summit of hills, ridges, and knobs, and the Blazon soil is on the side slopes of the hills, ridges, and knobs. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Blackhall fine sandy loam, 6 to 40 percent slopes, and Ralrod very fine sandy loam, 3 to 25 percent slopes. Also included are small areas of Poposhia loam, 2 to 20 percent slopes, on fan aprons and toe slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Rock outcrop occurs as exposures of soft shale.

The Blazon soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from soft shale. Typically, the surface layer is grayish brown clay loam 2 inches thick.

The underlying material is light olive brown clay loam 15 inches thick. Soft shale bedrock is at a depth of about 17 inches.

Permeability is moderately slow in the Blazon soil. Available water capacity is low. The effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly for wildlife habitat.

The potential plant community on the Blazon soil is mainly 20 to 40 percent rhizomatous wheatgrasses, 5 to 15 percent bluebunch wheatgrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 10 percent winterfat. As the range condition deteriorates, bluegrass and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, the restricted rooting depth, droughtiness, and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Aerial broadcasting is a suitable method of seeding. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site. The Blazon soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Clayey, 10- to 14-inch precipitation, High Plains Southeast range site.

**198—Rock outcrop-Mosroc complex, hilly.** This map unit is on knobs, mountain ridges, and hillslopes. Slopes are 1 to 15 percent. Areas are irregular in shape and are 30 to 200 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 45 percent Rock outcrop and 35 percent Mosroc gravelly loam, 1 to 15 percent slopes.

The Rock outcrop is on exhumed knobs, ridges, and the summit of hills, and the Mosroc soil is on mountain ridges and hillslopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Pesmore gravelly sandy loam, 10 to 20 percent slopes; Uhl loam, 1 to 8 percent slopes, on valley sides; Hoodle very gravelly loam, 1 to 15 percent slopes, on terraces; and Lymanson gravelly loam, 4 to 15 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Rock outcrop occurs as exposures of schist, gneiss, and granite.

The Mosroc soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from granite. Typically, 40 percent of the surface is covered with gravel and cobbles. The surface layer is brown gravelly loam 3 inches thick. The subsoil is dark yellowish brown very gravelly sandy clay loam 7 inches thick. Granite bedrock is at a depth of about 10 inches.

Permeability is moderate in the Mosroc soil. Available water capacity is low. The effective rooting depth is 9 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Mosroc soil is mainly 20 to 40 percent bluebunch wheatgrass, 5 to 15 percent Indian ricegrass, 5 to 10 percent bottlebrush squirreltail, and 5 to 15 percent rhizomatous wheatgrasses. As the range condition deteriorates, big sagebrush, low rabbitbrush, and unpalatable forbs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 600 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, droughtiness, the content of rock fragments, and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Aerial broadcasting is a suitable method of seeding. Grazing should be delayed

until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site. The Mosroc soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Igneous, 10- to 14-inch precipitation, Foothills and Basins West range site.

**199—Rock outcrop-Oceanet complex, hilly.** This map unit is on hills, ridges, and escarpments. Slopes are 5 to 45 percent. Areas are irregular in shape and are 20 to 300 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,200 to 6,500 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 115 to 130 days.

This unit is about 45 percent Rock outcrop and 40 percent Oceanet sandy loam, 5 to 45 percent slopes. The Rock outcrop is on the summit of hills and ridges and on escarpments, and the Oceanet soil is on the shoulder slopes and back slopes of hills and ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Persayo clay loam, 3 to 45 percent slopes, and Worland sandy loam, 2 to 35 percent slopes. Also included are small areas of Apron sandy loam, 1 to 10 percent slopes, on fan aprons; Lostwells sandy clay loam, 1 to 8 percent slopes, on fan aprons and flood plains; and a soil that is similar to the Oceanet soil but is less than 10 inches deep over bedrock. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Rock outcrop occurs as exposures of soft sandstone interbedded with shale.

The Oceanet soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is yellowish brown sandy loam 5 inches thick. The underlying material is light olive brown sandy loam 11 inches thick. Soft sandstone bedrock is at a depth of about 16 inches.

Permeability is moderately rapid in the Oceanet soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Oceanet soil is mainly 25 to 35 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 5 to 15 percent bluebunch wheatgrass, and 10 to 20 percent Indian

ricegrass. As the range condition deteriorates, threadleaf sedge, forbs, blue grama, and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 250 pounds of air-dry vegetation per acre in normal years. Production ranges from 350 pounds in favorable years to 125 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, droughtiness, and the restricted rooting depth. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Aerial broadcasting is a suitable method of seeding. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site. The Oceanet soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Sandy, 5- to 9-inch precipitation, Wind River Basin range site.

**200—Roxal-Rock outcrop complex, steep.** This map unit is on hills and ridges. Slopes are 20 to 65 percent. Areas are irregular in shape and are 40 to 320 acres in size. The native vegetation is mainly grasses and a few shrubs. Elevation is 7,500 to 8,500 feet. The annual precipitation is 15 to 19 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is less than 60 days.

This unit is about 55 percent Roxal loam, 20 to 65 percent slopes, and 30 percent Rock outcrop. The Roxal soil is on the summit, shoulder slopes, and back slopes of hills and on the side slopes of ridges, and the Rock outcrop is on the summit of ridges and on escarpments. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Inchau loam, 10 to 30 percent slopes; Tongue River fine sandy loam, 20 to 30 percent slopes; and Burnette loam, 3 to 10 percent slopes. Also included are small areas of Decross loam, 2 to 15 percent slopes; Owen Creek very stony clay loam, 2 to 15 percent slopes; a soil that is similar to the Roxal soil but has underlying material of sandy loam; and Cragosen gravelly loam, 10 to 60 percent slopes. Included areas make up about 15

percent of the total acreage. The percentage varies from one area to another.

The Roxal soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone interbedded with shale. The surface layer is grayish brown loam 3 inches thick. The upper 11 inches of the underlying material is grayish brown sandy clay loam. The lower 3 inches is light olive brown clay loam. Soft shale bedrock is at a depth of about 17 inches. In some areas the surface layer is sandy clay loam.

Permeability is moderate in the Roxal soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Rock outcrop occurs as exposures of soft sandstone interbedded with shale.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Roxal soil is mainly 10 to 25 percent Columbia needlegrass, 10 to 25 percent Idaho fescue, 10 to 25 percent Kingspike fescue, and 0 to 10 percent mountainmahogany. As the range condition deteriorates, big sagebrush and black sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 850 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by a short growing season, the restricted rooting depth, and droughtiness. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Roxal soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Loamy, 15- to 19-inch precipitation, Foothills and Mountains East range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site.

**201—Roxal-Tongue River complex, hilly.** This map unit is on mountainsides and ridges. Slopes are 10 to 40 percent. Areas are irregular in shape and are 40 to

1,500 acres in size. The native vegetation on the Roxal soil is mainly grasses and shrubs. That on the Tongue River soil is mainly trees. Elevation is 7,500 to 9,000 feet. The annual precipitation is 18 to 22 inches, the annual temperature is 33 to 38 degrees F, and the frost-free period is less than 60 days.

This unit is about 55 percent Roxal sandy clay loam, 20 to 40 percent slopes, and 35 percent Tongue River fine sandy loam, 10 to 30 percent slopes. The Roxal soil is on mountainsides and ridges, and the Tongue River soil is on mountainsides. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Inchau loam, 10 to 30 percent slopes; Youga loam, 10 to 30 percent slopes; Owen Creek very stony clay loam, 10 to 15 percent slopes; and Gelkie fine sandy loam, 10 to 30 percent slopes. Also included are small areas of Roxal sandy clay loam, 40 to 65 percent slopes; a soil that is similar to the Roxal soil but has underlying material of sandy loam; and Cragosen gravelly loam, 10 to 40 percent slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Roxal soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone interbedded with shale. Typically, the surface layer is light yellowish brown sandy clay loam 4 inches thick. The upper 4 inches of the underlying material is pale yellow sandy clay loam. The lower 5 inches is pale yellow loam. Soft sandstone bedrock is at a depth of about 13 inches.

Permeability is moderate in the Roxal soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Tongue River soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone interbedded with shale. The surface layer is brown fine sandy loam 1 inch thick. The subsoil is yellowish brown sandy clay loam 13 inches thick. The substratum is yellowish brown sandy clay loam 19 inches thick. Soft sandstone bedrock is at a depth of about 33 inches.

Permeability is moderate in the Tongue River soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is slight.

The Roxal soil is used mainly as rangeland, and the Tongue River soil is used mainly as woodland. Both soils are used for wildlife habitat.

The potential plant community on the Roxal soil is

mainly 10 to 25 percent Columbia needlegrass, 10 to 25 percent Idaho fescue, 10 to 25 percent spike fescue, and 0 to 10 percent mountainmahogany. As the range condition deteriorates, big sagebrush and black sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 850 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing on the Roxal soil is limited by a short growing season, the restricted rooting depth, and droughtiness. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Tongue River soil is well suited to timber production. The site index for lodgepole pine ranges from 60 to 65. The site index for Douglas fir is 65 to 70. The main limitations affecting timber production and harvesting are the slope and erosion. Minimizing the risk of erosion is essential when timber is harvested. After the timber is harvested, carefully managed reforestation helps to control competition from undesirable understory plants. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.

Properly designed road drainage systems that include carefully located culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding road cuts and fills.

Conventional methods of harvesting timber can be used. Planting the trees on the contour helps to control erosion. Because the soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods.

The Roxal soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Loamy, 15- to 19-inch precipitation, Foothills and Mountains East range site. The Tongue River soil is in capability subclass VIe, nonirrigated. It is not assigned to a range site.

**202—Ryan Park loamy fine sand, undulating.** This very deep, well drained soil is on fan aprons. It formed in alluvium and eolian deposits derived from various sources. Slopes are 1 to 8 percent. Areas are irregular in shape and are 30 to 800 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,000 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

Included in this unit are small areas of Bosler fine sandy loam, 1 to 8 percent slopes; Rock River fine sandy loam, 1 to 8 percent slopes; Cushool sandy loam, 2 to 25 percent slopes; and Zeomont loamy sand, 2 to 15 percent slopes, on low dunes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Typically, the surface layer of the Ryan Park soil is grayish brown loamy fine sand 3 inches thick. The upper part of the subsoil is brown and light olive brown fine sandy loam 14 inches thick. The lower part is light olive brown fine sandy loam 17 inches thick. The substratum to a depth of 60 inches or more is light olive brown sandy loam.

Permeability is moderately rapid. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and silver sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, a short growing season, and wind erosion. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep

windblown sand from damaging seedlings. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**203—Ryan Park-Carmody association, 1 to 15 percent slopes.** This map unit is on hills, ridges, and fan aprons. Areas are irregular in shape and are 40 to 320 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,800 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 50 percent Ryan Park sandy loam, 1 to 8 percent slopes, and 35 percent Carmody sandy loam, 3 to 15 percent slopes. The Ryan Park soil is on fan aprons, and the Carmody soil is on the side slopes of hills and ridges.

Included in this unit are small areas of Bosler fine sandy loam, 1 to 8 percent slopes; Rock River fine sandy loam, 1 to 8 percent slopes; Cushool sandy loam, 2 to 25 percent slopes; and Carmody sandy loam, 15 to 25 percent slopes. Also included are small areas of Blackhall fine sandy loam, 5 to 30 percent slopes; Cragosen gravelly loam, 3 to 30 percent slopes; and Rentsac very gravelly loam, 15 to 40 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Ryan Park soil is very deep and well drained. It formed in alluvium and eolian deposits derived from various sources. Typically, the surface layer is brown sandy loam 5 inches thick. The upper 10 inches of the subsoil is yellowish brown sandy loam. The lower 19 inches is pale brown fine sandy loam. The substratum to a depth of 60 inches or more is very pale brown sandy loam.

Permeability is moderately rapid in the Ryan Park soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Carmody soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is brown sandy loam 5 inches thick. The underlying material is pale brown and light yellowish brown fine sandy loam 33 inches thick. Soft sandstone bedrock is at a depth of about 38 inches.

Permeability is moderate in the Carmody soil. Available water capacity also is moderate. The effective

rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and silver sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, a short growing season, and wind erosion and by droughtiness in the Carmody soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**204—Ryark sandy loam, 1 to 6 percent slopes.**

This very deep, well drained soil is on fan aprons. It formed in alluvium derived dominantly from sandstone. Areas are irregular in shape and are 20 to 400 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 7,300 feet. The annual precipitation is 9 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 80 to 110 days.

Included in this unit are small areas of Bluerim sandy loam, 3 to 10 percent slopes; Onason sandy loam, 5 to 10 percent slopes; and Forelle loam, 1 to 6 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Typically, the surface layer of the Ryark soil is grayish brown sandy loam 5 inches thick. The subsoil is dark yellowish brown sandy loam 22 inches thick. The substratum to a depth of 60 inches or more is yellowish brown gravelly loamy sand.

Permeability is moderately rapid. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and silver sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, a short growing season, droughtiness, and wind erosion. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass IVe, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**205—Ryark-Zeomont loamy sands, rolling.** This map unit is on dunes and fan aprons. Slopes are 1 to 30 percent. Areas are irregular in shape and are 500 to 1,000 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,700 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 55 percent Ryark loamy sand, 1 to 10 percent slopes, and 30 percent Zeomont loamy sand, 2 to 30 percent slopes. The Ryark soil is on fan aprons, and the Zeomont soil is on dunes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Bluerim sandy loam, 3 to 15 percent slopes; Onason sandy loam, 5 to 30 percent slopes, on hillslopes; and a coarse textured soil that has a dark surface layer and has slopes of 1 to 10 percent. Also included are small areas of blowouts. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Ryark soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone. Typically, the surface layer is pale brown loamy sand 6 inches thick. The subsoil is light yellowish brown sandy loam 7 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown loamy sand.

Permeability is moderately rapid in the Ryark soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Zeomont soil is very deep and excessively drained. It formed in sandy eolian material derived from various sources. Typically, the surface layer is pale brown loamy sand 3 inches thick. The underlying material to a depth of 60 inches or more is light yellowish brown loamy sand.

Permeability is rapid in the Zeomont soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Ryark soil is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and silver sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Zeomont soil is mainly 35 to 50 percent needleandthread, 15 to 25 percent Indian ricegrass, 10 to 20 percent thickspike wheatgrass, and 5 to 10 percent silver sagebrush. As

the range condition deteriorates, threadleaf sedge and forbs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,700 pounds in favorable years to 900 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by droughtiness, low precipitation, a short growing season, and wind erosion. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VIe, nonirrigated. The Ryark soil is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site. The Zeomont soil is in the Sands, 10- to 14-inch precipitation, High Plains Southeast range site.

**206—Sandbranch-Ryan Park Variant-Poposhia complex, 1 to 8 percent slopes.** This map unit is on fan aprons, flood plains, dunes, and terraces. Areas are irregular in shape and are 50 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,800 to 7,500 feet. The annual precipitation is 7 to 9 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 50 percent Sandbranch loam, 1 to 3 percent slopes; 15 percent Ryan Park Variant loamy fine sand, 1 to 8 percent slopes; and 15 percent Poposhia loam, 1 to 8 percent slopes. The Sandbranch soil is on fan aprons and terraces, the Ryan Park Variant soil is on dunes, fan aprons, and low terraces, and the Poposhia soil is on fan aprons. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of slick spots; a soil that is adjacent to the Poposhia soil and is similar to that soil but is wet; Cushool sandy loam, 2 to 8

percent slopes, adjacent to the Ryan Park Variant soil; and Tisworth sandy loam, 0 to 8 percent slopes, adjacent to the Sandbranch soil. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Sandbranch soil is very deep and well drained. It formed in alluvium derived dominantly from sodic sandstone interbedded with shale. Typically, the surface layer is light brownish gray loam 2 inches thick. The upper 15 inches of the subsoil is light brownish gray, sodium-affected clay loam. The next 3 inches is brown, sodium-affected sandy clay loam. The lower 14 inches is olive, sodium-affected loam. The substratum to a depth of 60 inches or more is grayish brown, sodium-affected fine sandy loam stratified with thin lenses of loam, sandy loam, and clay loam.

Permeability is moderately slow in the Sandbranch soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Ryan Park Variant soil is deep and well drained. It formed in alluvium and eolian deposits derived from various sources. Typically, the surface layer is brown loamy fine sand 6 inches thick. The upper 42 inches of the subsoil is brown fine sandy loam. The lower 7 inches is brown, sodium-affected fine sandy loam. Soft shale bedrock is at a depth of about 55 inches.

Permeability is moderately rapid in the Ryan Park Variant soil. Available water capacity is moderate. The effective rooting depth is 40 to 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Poposhia soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is light brownish gray loam 10 inches thick. The underlying material to a depth of 60 inches or more is brown clay loam. In some areas the surface layer is clay loam.

Permeability is moderate in the Poposhia soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Sandbranch soil is mainly 10 to 20 percent alkali sacaton, 10 to 20 percent western wheatgrass, 5 to 15 percent basin wildrye, and 10 to 25 percent greasewood. As the range condition deteriorates, greasewood and inland saltgrass increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The

potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,000 pounds in favorable years to 800 pounds in unfavorable years.

The potential plant community on the Ryan Park Variant soil is mainly 10 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 700 pounds in favorable years to 300 pounds in unfavorable years.

The potential plant community on the Poposhia soil is mainly 10 to 30 percent rhizomatous wheatgrasses, 5 to 15 percent needleandthread, 5 to 10 percent Indian ricegrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, bluegrass, upland sedges, and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 700 pounds in favorable years to 300 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season, by alkalinity in the Sandbranch soil, and by wind erosion on the Ryan Park Variant soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control water erosion and wind erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings.

The Sandbranch soil is in capability subclass VI<sub>1</sub>, nonirrigated. It is in the Saline Lowland, 7- to 9-inch precipitation, Green River and Great Divide Basin range site. The Ryan Park Variant and Poposhia soils are in capability subclass VI<sub>2</sub>, nonirrigated. The Ryan Park Variant soil is in the Sandy, 7- to 9-inch precipitation, Green River and Great Divide Basin range site. The Poposhia soil is in the Loamy, 7- to 9-inch precipitation, Green River and Great Divide Basin range site.

**207—Sinkson-Almy sandy clay loams, 0 to 6 percent slopes.** This map unit is on fan aprons. Areas are irregular in shape and are 5 to 300 acres in size. The vegetation in areas that are not cultivated is mainly grasses and shrubs. Elevation is 6,500 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 50 percent Sinkson sandy clay loam, 0 to 6 percent slopes, and 30 percent Almy sandy clay loam, 0 to 6 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Lupinto loam, 1 to 6 percent slopes, on terraces; Poposhia loam, 1 to 6 percent slopes; Rockinchair loam, 1 to 6 percent slopes; and a soil that is similar to the Almy soil but is very gravelly in the lower part of the subsoil and in the substratum and has slopes of 1 to 6 percent. Also included are small areas of a soil that is similar to the Sinkson soil but has slopes of 1 to 8 percent and is finer textured in the underlying material. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Sinkson soil is very deep and well drained. It formed in alluvium derived from sandstone and siltstone. Typically, the surface layer is brown sandy clay loam 5 inches thick. The subsoil is reddish brown sandy clay loam 5 inches thick. The upper 30 inches of the substratum is reddish yellow sandy clay loam. The lower part to a depth of 60 inches or more is reddish brown loam.

Permeability is moderate in the Sinkson soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Almy soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone interbedded with shale. Typically, the surface layer is brown sandy clay loam 3 inches thick. The upper 5 inches of the subsoil is reddish brown clay loam. The next 9 inches is reddish brown sandy clay loam. The lower 23 inches is light reddish brown sandy clay loam and loam. The substratum to a depth of 60 inches or more is light reddish brown gravelly sandy loam.

Permeability is moderate in the Almy soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

Most areas of this unit are used for irrigated hay and



Figure 8.—Contour ditch irrigation in an area of Sinkson-Almy sandy clay loams, 0 to 6 percent slopes.

pasture. A few areas are used as rangeland and wildlife habitat.

This unit is well suited to irrigated hay and pasture. The main limitations are the slope and a short growing season. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Annual applications of nitrogen and phosphorus fertilizer are needed to maintain the production of high-quality forage. Irrigation water can be applied by the contour ditch or sprinkler method (fig. 8). The border or furrow method also can be used, especially in nearly level areas. Leveling helps to ensure a uniform application of water. To prevent overirrigation and the leaching of plant nutrients and to control water erosion, applications of irrigation water should be adjusted to the available water capacity and the rate of water intake in the soils.

The potential plant community on this unit is mainly 20 to 30 percent rhizomatous wheatgrasses, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, sedges and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear, annual grasses, and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an

undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site. It is prime farmland in areas where it is irrigated and an adequate water supply is available.

**208—Sinkson-Almy-Thermopolis association, rolling.** This map unit is on hills, ridges, and fan aprons. Slopes are 2 to 30 percent. Areas are irregular in shape and are 5 to 640 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,500 to 7,800 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 45 percent Sinkson loam, 2 to 15 percent slopes; 20 percent Almy loam, 2 to 10 percent slopes; and 20 percent Thermopolis loam, 10 to 30 percent slopes. The Sinkson and Almy soils are on fan aprons, and the Thermopolis soil is on hills and ridges.

Included in this unit are small areas of Blackhall fine sandy loam, 5 to 30 percent slopes; Carmody fine sandy loam, 2 to 30 percent slopes; and Rock outcrop on hills and ridges adjacent to the Thermopolis soil. Also included are small areas of Diamondville loam, 2 to 15 percent slopes; Forelle loam, 2 to 15 percent slopes; Poposhia loam, 1 to 15 percent slopes; and Tisworth loam, 2 to 8 percent slopes, adjacent to the Sinkson and Almy soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Sinkson soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone and siltstone. Typically, the surface layer is reddish brown loam 4 inches thick. The underlying material to a depth of 60 inches or more is reddish brown and yellowish red silt loam.

Permeability is moderate in the Sinkson soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Almy soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone interbedded with shale. Typically, the surface layer is yellowish brown loam 2 inches thick. The upper 8 inches of the subsoil is reddish brown loam. The next

10 inches is reddish brown clay loam. The lower 10 inches is light reddish brown loam. The substratum to a depth of 60 inches or more is yellowish red loam.

Permeability is moderate in the Almy soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Thermopolis soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from sandstone and siltstone. Typically, the surface layer is red loam 3 inches thick. The underlying material also is red loam. It is 13 inches thick. Soft siltstone bedrock is at a depth of about 16 inches.

Permeability is moderate in the Thermopolis soil. Available water capacity is low. The effective rooting depth is 6 to 20 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Sinkson and Almy soil is mainly 20 to 30 percent rhizomatous wheatgrasses, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, sedges and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Thermopolis soil is mainly 20 to 35 percent bluebunch wheatgrass, 10 to 20 percent rhizomatous wheatgrasses, 5 to 15 percent needlegrasses, and 5 to 10 percent black sagebrush. As the range condition deteriorates, bluegrasses, sedges, and black sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 700 pounds in favorable years to 350 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season and by droughtiness and the restricted rooting depth in the Thermopolis soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These

practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed on the Sinkson and Almy soils if the amount of desirable vegetation is not sufficient for natural seeding to occur. Because of the slope, the restricted depth to bedrock, and droughtiness, the Thermopolis soil is poorly suited to range seeding that involves tillage. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Sinkson and Almy soils are in capability subclass IVe, nonirrigated. They are in the Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site. The Thermopolis soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Loamy, 10- to 14-inch precipitation, Foothills and Basins East range site.

**209—Starman-Rock outcrop-Woosley complex, steep.** This map unit is on ridges, hills, and mountains. Slopes are 10 to 40 percent. Areas are irregular in shape and are 40 to 2,000 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,800 to 9,000 feet. The annual precipitation is 15 to 19 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 50 percent Starman very gravelly loam, 10 to 40 percent slopes; 20 percent Rock outcrop; and 15 percent Woosley loam, 10 to 25 percent slopes. The Starman soil is on the summit of ridges, hills, and mountains, the Rock outcrop is on the summit of ridges and hills and on escarpments, and the Woosley soil is on the side slopes of mountains. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Bachus loam, 10 to 20 percent slopes; Decross loam, 10 to 25 percent slopes, adjacent to the Woosley soil; and Mosroc gravelly loam, 10 to 15 percent slopes, adjacent to the Starman soil. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Starman soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived from limestone. Typically, 40 percent of the surface is covered with limestone gravel and cobbles. The surface layer is brown very gravelly loam 2 inches thick. The subsoil is brown and light gray very gravelly loam 10 inches thick. Limestone bedrock is at a depth of about 12 inches.

Permeability is moderate in the Starman soil. Available water capacity is low. The effective rooting depth is 8 to 20 inches. Runoff is medium, and the

hazard of water erosion is moderate. The hazard of wind erosion is slight.

The Rock outcrop occurs as exposures of limestone and fine grained, calcareous sandstone.

The Woosley soil is moderately deep and well drained. It formed in residuum and slope alluvium derived from limestone. Typically, the surface layer is very dark grayish brown loam 5 inches thick. The upper 10 inches of the subsoil is brown clay loam. The next 13 inches is pale brown clay loam. The lower 5 inches is light gray clay loam. Limestone bedrock is at a depth of about 33 inches.

Permeability is moderate in the Woosley soil. Available water capacity also is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Starman soil is mainly 10 to 25 percent Columbia needlegrass, 10 to 25 percent Idaho fescue, 10 to 25 percent Kingspike fescue, and 0 to 10 percent mountainmahogany. As the range condition deteriorates, big sagebrush and black sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 850 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Woosley soil is mainly 10 to 25 percent Columbia needlegrass, 10 to 25 percent Kingspike fescue, 10 to 25 percent Idaho fescue, and 5 to 10 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by a short growing season and by the restricted rooting depth, content of rock fragments, and droughtiness in the Starman soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Because of the Rock outcrop, the

best method of brush control is aerial spraying or prescribed burning. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Starman soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Loamy, 15- to 19-inch precipitation, Foothills and Mountains East range site. The Rock outcrop is in capability class VIII, nonirrigated. It is not assigned to a range site. The Woosley soil is in capability subclass VIe, nonirrigated. It is in the Loamy, 15- to 19-inch precipitation, Foothills and Mountains East range site.

**210—Taluce-Bowbac sandy loams, hilly.** This map unit is on the side slopes of ridges and hills. Slopes are 3 to 45 percent. Areas are irregular in shape and are 10 to 200 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 6,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 45 to 49 degrees F, and the frost-free period is 115 to 130 days.

This unit is about 40 percent Taluce sandy loam, 5 to 45 percent slopes, and 40 percent Bowbac sandy loam, 3 to 12 percent slopes. The Taluce soil is on the shoulder slopes of ridges and hills, and the Bowbac soil is on hillslopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Vonalee loamy sand, 3 to 12 percent slopes; Hiland sandy loam, 3 to 15 percent slopes, on fan aprons; a soil that is adjacent to the Bowbac soil and is similar to that soil but is sandy loam in the upper part of the subsoil and has slopes of 3 to 12 percent; and Rock outcrop on ridges and hills. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Taluce soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is brown sandy loam 4 inches thick. The underlying material is dark yellowish brown sandy loam 8 inches thick. Soft sandstone bedrock is at a depth of about 12 inches.

Permeability is moderately rapid in the Taluce soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

The Bowbac soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone interbedded with shale. Typically, the surface layer is yellowish brown sandy loam 5 inches thick. The upper 10 inches of the subsoil is yellowish brown sandy clay loam. The next 18

inches is yellowish brown sandy loam. The lower 4 inches is brownish yellow sandy loam. Soft sandstone bedrock is at a depth of about 37 inches.

Permeability is moderate in the Bowbac soil. Available water capacity also is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Taluce soil is mainly 15 to 25 percent bluebunch wheatgrass, 5 to 10 percent Indian ricegrass, 5 to 15 percent needleandthread, and 5 to 10 percent big sagebrush. As the range condition deteriorates, Sandberg bluegrass, threadleaf sedge, and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Bowbac soil is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and silver sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and wind erosion and by droughtiness and the restricted rooting depth in the Taluce soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Brush control may be needed on the Bowbac soil. Because of droughtiness in the Taluce soil, brush control may not be suitable. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed.

The Taluce soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Sandy, 10- to 14-inch

precipitation, High Plains Southeast range site. The Bowbac soil is in capability subclass IVe, nonirrigated. It is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**211—Thermopolis-Sinkson association, hilly.** This map unit is on hills, ridges, and fan aprons. Slopes are 3 to 30 percent. Areas are irregular in shape and are 160 to 640 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,500 to 7,800 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 60 percent Thermopolis loam, 10 to 30 percent slopes, and 20 percent Sinkson loam, 3 to 20 percent slopes. The Thermopolis soil is on hills and ridges, and the Sinkson soil is on fan aprons.

Included in this unit are Blackhall fine sandy loam, 5 to 30 percent slopes, and Carmody fine sandy loam, 3 to 30 percent slopes, both of which are adjacent to the Thermopolis soil, and small areas of Rock outcrop on the summit of hills and ridges. Also included are small areas of Almy loam, 3 to 10 percent slopes; Diamondville loam, 3 to 15 percent slopes; Forelle loam, 3 to 20 percent slopes; and Poposhia loam, 3 to 30 percent slopes, all of which are adjacent to the Sinkson soil. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Thermopolis soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from sandstone and siltstone. Typically, the surface layer is yellowish red loam 2 inches thick. The underlying material also is yellowish red loam. It is 8 inches thick. Soft sandstone bedrock is at a depth of about 10 inches.

Permeability is moderate in the Thermopolis soil. Available water capacity is low. The effective rooting depth is 6 to 20 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Sinkson soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone and siltstone. Typically, the surface layer is yellowish red loam 3 inches thick. The subsoil also is yellowish red loam. It is 11 inches thick. The underlying material to a depth of 60 inches or more is yellowish red silt loam.

Permeability is moderate in the Sinkson soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used as rangeland. It also is used for wildlife habitat.

The potential plant community on the Thermopolis soil is mainly 20 to 35 percent bluebunch wheatgrass, 10 to 20 percent rhizomatous wheatgrasses, 5 to 15 percent needleandthread, and 5 to 10 percent black sagebrush. As the range condition deteriorates, bluegrasses, sedges, and black sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 700 pounds in favorable years to 350 pounds in unfavorable years.

The potential plant community on the Sinkson soil is mainly 20 to 30 percent rhizomatous wheatgrasses, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, sedges and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season and by the restricted rooting depth and droughtiness in the Thermopolis soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Also, brush control may be needed on the Sinkson soil. It may not be suitable on the Thermopolis soil because of droughtiness. Range seeding may be needed on the Sinkson soil if the amount of desirable vegetation is not sufficient for natural seeding to occur.

The Thermopolis soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Loamy, 10- to 14-inch precipitation, Basins and Foothills East range site. The Sinkson soil is in capability subclass VIe, nonirrigated. It is in the Loamy, 10- to 14-inch precipitation, Basins and Foothills East range site.

**212—Tisworth-Absher-Forelle complex, 0 to 6 percent slopes.** This map unit is on fan aprons and terraces. Areas are long and narrow and are 100 to 800 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,500 to 7,000 feet. The annual precipitation is 10 to 14 inches, the average annual air

temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 35 percent Tisworth sandy loam, 0 to 3 percent slopes; 30 percent Absher loam, 0 to 3 percent slopes; and 20 percent Forelle loam, 1 to 6 percent slopes. The Tisworth and Forelle soils are on fan aprons, and the Absher soil is on fan aprons and terraces. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Abston sandy loam, 1 to 6 percent slopes, and Diamondville loam, 1 to 6 percent slopes, both of which are on hillslopes. Also included are small areas of Havre loam, 0 to 3 percent slopes, and Ryan Park fine sandy loam, 1 to 8 percent slopes, both of which are on fan aprons. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Tisworth soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown sandy loam 3 inches thick. The upper part of the subsoil is light yellowish brown, sodium-affected sandy clay loam 17 inches thick. The lower part to a depth of 60 inches or more is light yellowish brown sandy clay loam.

Permeability is slow in the Tisworth soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Absher soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown loam 3 inches thick. The upper 8 inches of the subsoil is brown, sodium-affected silty clay. The lower part to a depth of 60 inches or more is light yellowish brown, sodium-affected clay.

Permeability is very slow in the Absher soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Forelle soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown loam 4 inches thick. The upper 20 inches of the subsoil is brown and yellowish brown clay loam. The lower 21 inches is pale brown loam. The substratum to a depth of 60 inches or more is light olive brown sandy clay loam.

Permeability is moderately slow in the Forelle soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the

hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Tisworth and Absher soils is mainly 25 to 45 percent western wheatgrass, 10 to 20 percent bottlebrush squirreltail, 10 to 20 percent Indian ricegrass, and 25 to 40 percent birdfoot sagebrush. As the range condition deteriorates, birdfoot sagebrush increases in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production ranges from 500 pounds in favorable years to 250 pounds in unfavorable years.

The potential plant community on the Forelle soil is mainly 30 to 40 percent western wheatgrass, 5 to 15 percent needleandthread, 5 to 15 percent bluebunch wheatgrass, and 5 to 15 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. It also is limited by the available water capacity, salinity, and alkalinity of the Tisworth and Absher soils. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Tisworth and Absher soils are in capability subclass VI<sub>s</sub>, nonirrigated. They are in the Impervious Clay, 10- to 14-inch precipitation, High Plains Southeast range site. The Forelle soil is in capability subclass IV<sub>e</sub>, nonirrigated. It is in the Loamy, 10- to 14-inch precipitation, High Plains Southeast range site.

**213—Tisworth-Poposhia complex, undulating.** This map unit is on fan aprons and toe slopes. Slopes are 1 to 8 percent. Areas are irregular in shape and are 40 to

200 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,000 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days. The Tisworth soil receives additional moisture in the form of runoff from the higher adjacent areas.

This unit is about 50 percent Tisworth fine sandy loam, 1 to 8 percent slopes, and 30 percent Poposhia clay loam, 1 to 8 percent slopes. Both soils are on fan aprons and toe slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of slick spots; Absher loam, 1 to 8 percent slopes; Bosler sandy loam, 1 to 8 percent slopes, adjacent to the Tisworth soil; Countryman loam, 0 to 3 percent slopes, on flood plains; and a soil that is on low mounds adjacent to the Tisworth soil and is similar to that soil but is sandy loam in the upper part of the subsoil. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Tisworth soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is light brownish gray fine sandy loam 2 inches thick. The upper part of the subsoil is yellowish brown, sodium-affected sandy clay loam 14 inches thick. The lower part to a depth of 60 inches or more is pale brown sandy loam.

Permeability is slow in the Tisworth soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Poposhia soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is light brownish gray clay loam 4 inches thick. The underlying material to a depth of 60 inches or more is light yellowish brown clay loam.

Permeability is moderate in the Poposhia soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Tisworth soil is mainly 15 to 30 percent alkali sacaton, 10 to 20 percent basin wildrye, 5 to 10 percent rhizomatous wheatgrasses, and 10 to 25 percent greasewood. As the range condition deteriorates, greasewood and inland saltgrass increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces

about 1,800 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,500 pounds in favorable years to 1,200 pounds in unfavorable years.

The potential plant community on the Poposhia soil is mainly 40 to 50 percent thickspike wheatgrass, 15 to 25 percent green needlegrass, 5 to 10 percent bluebunch wheatgrass, 15 to 25 percent bottlebrush squirreltail, and 5 to 10 percent big sagebrush. As the range condition deteriorates, rhizomatous wheatgrasses, Canby bluegrass, and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,000 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,300 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season and by alkalinity in the Tisworth soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Tisworth soil is in capability subclass VI<sub>s</sub>, nonirrigated. It is in the Saline Lowland, 10- to 14-inch precipitation, High Plains Southeast range site. The Poposhia soil is in capability subclass IV<sub>e</sub>, nonirrigated. It is in the Clayey, 10- to 14-inch precipitation, High Plains Southeast range site.

**214—Tisworth-Ryan Park-Countryman complex, gently undulating.** This map unit is on flood plains and fan aprons. Slopes are 0 to 6 percent. Areas are irregular in shape and are 10 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,500 to 7,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

This unit is about 40 percent Tisworth loamy sand, 1 to 6 percent slopes; 25 percent Ryan Park sandy loam, 1 to 6 percent slopes; and 15 percent Countryman fine sandy loam, 0 to 3 percent slopes. The Tisworth and Ryan Park soils are on fan aprons, and the Countryman

soil is on flood plains. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of slick spots; Bosler sandy loam, 1 to 6 percent slopes; and Poposhia clay loam, 1 to 6 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Tisworth soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown loamy sand 3 inches thick. The upper 17 inches of the subsoil is brown, sodium-affected sandy clay loam. The next 7 inches is light brown, sodium-affected sandy clay loam. The lower part to a depth of 60 inches or more is pale brown sandy loam stratified with thin, discontinuous lenses of gravelly loamy sand, fine sandy loam, and sandy clay loam. In some areas the surface layer is sandy loam.

Permeability is slow in the Tisworth soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Ryan Park soil is very deep and well drained. It formed in alluvium and eolian deposits derived from various sources. Typically, the surface layer is pale brown sandy loam 4 inches thick. The upper 11 inches of the subsoil is brown sandy loam. The lower 15 inches is pale brown sandy loam. The substratum to a depth of 60 inches or more also is pale brown sandy loam.

Permeability is moderately rapid in the Ryan Park soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Countryman soil is very deep and somewhat poorly drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown fine sandy loam 2 inches thick. The underlying material to a depth of 60 inches or more is brown very fine sandy loam stratified with thin lenses of loamy fine sand, loam, and clay loam.

Permeability is moderate in the Countryman soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. The seasonal high water table fluctuates between depths of 1.5 and 3.5 feet during the period May through September. This soil is frequently flooded for brief periods from March through July.

This unit is used mainly as rangeland and wildlife habitat. It also is used for irrigated hay and pasture.

The potential plant community on the Tisworth and Ryan Park soils is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedges and silver sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Countryman soil is mainly 50 to 60 percent alkali sacaton, 15 to 25 percent basin wildrye, 5 to 10 percent inland saltgrass, and 5 to 10 percent rubber rabbitbrush. As the range condition deteriorates, greasewood and inland saltgrass increase in abundance. As the range condition further deteriorates, annual grasses and forbs invade. The potential plant community produces about 3,000 pounds of air-dry vegetation per acre in normal years. Production ranges from 3,400 pounds in favorable years to 2,500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, wind erosion, and a short growing season. It also is limited by salinity and alkalinity in the Tisworth soil and salinity in the Countryman soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

If this unit is used for irrigated hay and pasture, the main management concerns are the hazard of flooding, the fluctuating high water table, and salinity in the Countryman soil and salinity and alkalinity in the Tisworth soil. The salinity in the subsoil of the Tisworth soil and in the surface layer and underlying material of the Countryman soil limits forage production. Leaching the salts in the Countryman soil is difficult because of the high water table. A drainage system helps to overcome this limitation. Salt-tolerant species should be selected for planting. Grazing during wet periods results in compaction of the surface layer, poor tilth, and

excessive runoff. Proper grazing practices, weed control, and rotation grazing are needed to ensure the maximum quality of forage. Periodic mowing and clipping help to maintain a uniform plant cover and discourage selective grazing. Annual applications of nitrogen fertilizer are needed to maintain the production of high-quality forage.

The contour ditch, sprinkler, or border irrigation method is suitable on this unit. The border method is suitable in nearly level areas. To prevent overirrigation and the leaching of plant nutrients and to control water erosion, applications of irrigation water should be adjusted to the available water capacity and rate of water intake in the soils. For the efficient application and removal of irrigation water, leveling is needed in uneven areas. Intensive management is required to reduce salinity and maintain productivity.

The Tisworth soil is in capability subclasses IVs, irrigated, and VIs, nonirrigated. The Ryan Park soil is in capability subclasses IVe, nonirrigated, and IIIe, irrigated. The Tisworth and Ryan Park soils are in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site. The Countryman soil is in capability subclasses VIw, nonirrigated, and IVw, irrigated. It is in the Saline Subirrigated, 10- to 14-inch precipitation, High Plains Southeast range site.

**215—Tongue River-Inchau-Farlow Variant complex, 10 to 30 percent slopes.** This map unit is on mountain slopes. Areas are irregular in shape and are 160 to 2,000 acres in size. The native vegetation is mainly trees and an understory of scattered grasses, shrubs, and forbs. Elevation is 7,000 to 9,000 feet. The annual precipitation is 18 to 22 inches, the average annual air temperature is 33 to 38 degrees F, and the frost-free period is less than 60 days.

This unit is about 40 percent Tongue River loam, 10 to 30 percent slopes; 30 percent Inchau sandy clay loam, 10 to 30 percent slopes; and 15 percent Farlow Variant loam, 10 to 30 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Cloud Peak gravelly loam, 10 to 30 percent slopes, and Youga loam, 10 to 30 percent slopes. Also included are small areas of Burnette loam, 3 to 10 percent slopes; Roxal sandy clay loam, 30 to 65 percent slopes; and a soil that is similar to the Inchau soil but is redder. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Tongue River soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone interbedded with

shale. Typically, the surface is covered with a mat of undecomposed forest litter 2 inches thick. The surface layer is brown loam 1 inch thick. The subsoil is dark yellowish brown sandy clay loam 18 inches thick. The substratum is very pale brown very channery sandy clay loam 15 inches thick. Soft sandstone bedrock is at a depth of about 34 inches. In some areas the surface layer is sandy clay loam.

Permeability is moderate in the Tongue River soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Inchau soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone interbedded with shale. Typically, the surface is covered with a mat of undecomposed forest litter 1 inch thick. The surface layer is brown sandy clay loam 1 inch thick. The subsoil also is brown sandy clay loam. It is 18 inches thick. The substratum is very pale brown very gravelly sandy clay loam 19 inches thick. Soft sandstone bedrock is at a depth of about 38 inches. In some areas the surface layer is loam.

Permeability is moderate in the Inchau soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Farlow Variant soil is moderately deep and well drained. It formed in residuum and local alluvium derived dominantly from sandstone. Typically, the surface is covered with a mat of undecomposed forest litter 1 inch thick. The surface layer is dark grayish brown loam 1 inch thick. The subsoil is brown channery loam 10 inches thick. The substratum is very pale brown very channery sandy clay loam 24 inches thick. Soft sandstone bedrock is at a depth of about 35 inches. In some areas the surface layer and subsoil are very channery.

Permeability is moderate in the Farlow Variant soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as woodland. It also is used for wildlife habitat.

This unit is well suited to timber production. The site index for lodgepole pine ranges from 60 to 65. The site index for Douglas fir ranges from 65 to 70. The main limitations affecting timber production and harvesting are the slope and erosion. Minimizing the risk of erosion is essential when timber is harvested. Properly designed road drainage systems that include carefully

located culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding areas that have been cut and filled.

Conventional methods of harvesting timber can be used. The high-lead logging method is more efficient than most other methods and is less damaging to the soils. After the timber is harvested, carefully managed reforestation helps to control competition from undesirable understory plants. Planting the trees on the contour helps to control erosion. Because the soil is sticky when wet, most planting and harvesting equipment should be used only during dry periods.

This unit is in capability subclass VIe, nonirrigated. It is not assigned to a range site.

**216—Uffens-Muff-Frisite loams, 1 to 12 percent slopes.** This map unit is on hills, terraces, and fan aprons. Areas are irregular in shape and are 40 to 600 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,800 to 6,200 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit is about 35 percent Uffens loam, 1 to 8 percent slopes; 30 percent Muff loam, 1 to 12 percent slopes; and 15 percent Frisite loam, 1 to 5 percent slopes. The Uffens and Frisite soils are on terraces and fan aprons, and the Muff soil is on hillslopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of slick spots; Birdsley sandy clay loam, 1 to 12 percent slopes; Oceanet sandy loam, 5 to 12 percent slopes; Persayo clay loam, 3 to 12 percent slopes; Saddle sandy loam, 1 to 12 percent slopes; and Worland sandy loam, 1 to 12 percent slopes, adjacent to the Muff soil. Also included are small areas of Griffy sandy loam, 1 to 10 percent slopes, and Effington loam, 1 to 8 percent slopes, both of which are adjacent to the Uffens and Frisite soils. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Uffens soil is very deep and well drained. It formed in alluvium derived dominantly from shale interbedded with sandstone. Typically, the surface layer is light yellowish brown loam 4 inches thick. The upper 16 inches of the subsoil is light olive brown and light yellowish brown, sodium-affected clay loam. The next 20 inches is light yellowish brown clay loam. The lower part to a depth of 60 inches or more is pale brown loamy sand.

Permeability is moderately slow in the Uffens soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Muff soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from shale interbedded with sandstone. Typically, the surface layer is light olive brown loam 2 inches thick. The upper 18 inches of the subsoil is brown and light olive brown, sodium-affected clay loam. The lower 9 inches is light yellowish brown sandy clay loam. Soft shale bedrock is at a depth of about 29 inches.

Permeability is slow in the Muff soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Frisite soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown loam 6 inches thick. The upper 19 inches of the subsoil is pale brown clay loam. The lower 17 inches is very pale brown clay loam. The substratum to a depth of 60 inches or more is pale brown silty clay loam.

Permeability is moderate in the Frisite soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used as rangeland. It also is used for wildlife habitat.

The potential plant community on the Uffens and Muff soils is mainly 20 to 40 percent gardner saltbush, 15 to 25 percent Indian ricegrass, 10 to 25 percent bottlebrush squirreltail, and 10 to 15 percent rhizomatous wheatgrasses. As the range condition deteriorates, birdfoot sagebrush and annuals increase in abundance. As the range condition further deteriorates, halogeton and other annuals and weeds invade. The potential plant community produces about 300 pounds of air-dry vegetation per acre in normal years. Production ranges from 400 pounds in favorable years to 200 pounds in unfavorable years.

The potential plant community on the Frisite soil is mainly 10 to 20 percent Indian ricegrass, 20 to 40 percent rhizomatous wheatgrasses, 10 to 20 percent needleandthread, and 5 to 15 percent big sagebrush. As the range condition deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 400 pounds

of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 225 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation. It also is limited by droughtiness, salinity, and alkalinity in the Uffens and Muff soils. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Because of salinity and alkalinity in the Uffens and Muff soils, reseeding generally is not successful.

The Uffens soil is in capability subclass VI<sub>s</sub>, nonirrigated. The Muff soil is in capability subclass VI<sub>e</sub>, nonirrigated. The Uffens and Muff soils are in the Saline Upland, 5- to 9-inch precipitation, Wind River Basin range site. The Frisite soil is in capability subclass VI<sub>e</sub>, nonirrigated. It is in the Loamy, 5- to 9-inch precipitation, Wind River Basin range site.

**217—Uhl-Gelkie loams, 1 to 8 percent slopes.** This map unit is on alluvial fans and terraces. Areas are long and narrow and are 40 to 320 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,000 to 8,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days. The soils receive additional moisture in the form of runoff from melting snowdrifts.

This unit is about 45 percent Uhl loam, 1 to 6 percent slopes, and 35 percent Gelkie loam, 3 to 8 percent slopes. The Uhl soil is on alluvial fans, and the Gelkie soil is on terraces. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Abston fine sandy loam, 1 to 8 percent slopes, on hillslopes and Venapass loam, 1 to 3 percent slopes, along narrow drainageways. Also included are small areas of Hoodle gravelly loam, 8 to 15 percent slopes, on undulating plains and terraces and Irigul channery loam, 8 to 30 percent slopes, on ridges and hillslopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Uhl soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone, schist, and granite. Typically, the surface layer is dark grayish brown loam 4 inches thick. The subsoil is grayish brown loam 11 inches thick. The substratum to a depth of 60 inches or more also is grayish brown loam.

Permeability is moderate in the Uhl soil. Available

water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Gelkie soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone, schist, and granite. Typically, the surface layer is dark grayish brown loam 5 inches thick. The upper 10 inches of the subsoil is dark grayish brown sandy clay loam. The lower 15 inches is very pale brown loam. The substratum to a depth of 60 inches or more is pale brown loam.

Permeability is moderate in the Gelkie soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit mainly is 25 to 35 percent rhizomatous wheatgrasses, 10 to 20 percent slender wheatgrass, 10 to 20 percent needlegrasses, and 5 to 10 percent big sagebrush. As the range condition deteriorates, big sagebrush and bluegrasses increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,200 pounds in favorable years to 1,200 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VI<sub>e</sub>, nonirrigated. It is in the Loamy Overflow, 10- to 14-inch precipitation, High Plains Southeast range site.

**218—Venapass-Uhl-Absher loams, 1 to 6 percent slopes.** This map unit is on flood plains, terraces, and alluvial fans. Areas are long and narrow and are 5 to 600 acres in size. The native vegetation is mainly

grasses, shrubs, sedges, and willows. Elevation is 7,000 to 8,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days. The soils receive additional moisture in the form of runoff from the higher adjacent areas and from melting snowdrifts.

This unit is about 40 percent Venapass loam, 1 to 3 percent slopes; 20 percent Uhl loam, 1 to 6 percent slopes; and 20 percent Absher loam, 1 to 6 percent slopes. The Venapass soil is on flood plains, the Absher soil is on terraces, and the Uhl soil is on alluvial fans. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Silas loam, 1 to 6 percent slopes, and Gelkie fine sandy loam, 1 to 6 percent slopes. Also included are small areas of Abston gravelly sandy loam, 1 to 8 percent slopes, on hillslopes and Lymanson gravelly sandy loam, 4 to 25 percent slopes, on ridges and hillslopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Venapass soil is very deep and poorly drained. It formed in alluvium derived from various sources. Typically, the surface layer is dark grayish brown loam 16 inches thick. The subsurface layer is grayish brown sandy loam 4 inches thick. The substratum to a depth of 60 inches or more is gray gravelly coarse sandy loam.

Permeability is moderate in the Venapass soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight. The seasonal high water table fluctuates between the surface and a depth 18 inches from April through August. This soil is occasionally flooded for brief periods from April through June.

The Uhl soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown loam 4 inches thick. The subsoil also is brown loam. It is 9 inches thick. The substratum to a depth of 60 inches or more is light olive brown loam.

Permeability is moderate in the Uhl soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Absher soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown loam 2 inches thick. The upper 5 inches of the subsoil is brown,

sodium-affected clay. The next 6 inches is pale brown, sodium-affected clay. The lower part to a depth of 60 inches or more is pale brown clay loam.

Permeability is very slow in the Absher soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland and wildlife habitat. It also is used for irrigated hay and pasture.

The potential plant community on the Venapass soil is mainly 35 to 50 percent Nebraska sedge, 10 to 20 percent northern sedge, 5 to 15 percent tufted hairgrass, and 5 to 15 percent willows. As the range condition deteriorates, willows and roses increase in abundance. As the range condition further deteriorates, unpalatable rushes or sedges and annual forbs invade. The potential plant community produces about 5,000 pounds of air-dry vegetation per acre in normal years. Production ranges from 6,000 pounds in favorable years to 3,500 pounds in unfavorable years.

The potential plant community on the Uhl soil is mainly 25 to 35 percent rhizomatous wheatgrasses, 10 to 20 percent slender wheatgrass, 10 to 20 percent needlegrasses, and 5 to 10 percent big sagebrush. As the range condition deteriorates, big sagebrush and bluegrasses increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,200 pounds in favorable years to 1,200 pounds in unfavorable years.

The potential plant community on the Absher soil is mainly 10 to 25 percent western wheatgrass, 10 to 25 percent Indian ricegrass, 10 to 25 percent bottlebrush squirreltail, and 40 to 50 percent gardner saltbush. As the range condition deteriorates, birdfoot sagebrush, bottlebrush squirreltail, and Sandberg bluegrass increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 650 pounds in favorable years to 300 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and a short growing season. It also is limited by alkalinity in the Absher soil and the wetness of the Venapass soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife

habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

If this unit is used for irrigated hay and pasture, the main limitations are a short growing season, the salinity and alkalinity in the Absher soil, and wetness and flooding in areas of the Venapass soil. The salinity and alkalinity of the Absher soil limit forage production. Leaching the salts in this soil is difficult because of the restricted permeability. The wetness of the Venapass soil limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Applications of nitrogen and phosphate fertilizer improve the growth of forage plants. Grazing during wet periods results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Periodic mowing and clipping help to maintain a uniform plant cover and discourage selective grazing.

The Venapass soil is in capability subclasses Vw, nonirrigated, and IVw, irrigated. It is in the Wetland, 10- to 14-inch precipitation, High Plains Southeast range site. The Uhl soil is in capability subclasses VIe, nonirrigated, and IVc, irrigated. It is in the Loamy Overflow, 10- to 14-inch precipitation, High Plains Southeast range site. The Absher soil is in capability subclass VIi, irrigated and nonirrigated. It is in the Saline Upland, 10- to 14-inch precipitation, High Plains Southeast range site.

#### **219—Venapass-Silas loams, 0 to 6 percent slopes.**

This map unit is on flood plains and terraces. Areas are long and narrow and are 5 to 300 acres in size. The native vegetation is mainly grasses, sedges, willows, and shrubs. Elevation is 7,000 to 8,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 55 percent Venapass loam, 0 to 3 percent slopes, and 30 percent Silas loam, 1 to 6 percent slopes. The Venapass soil is on flood plains, and the Silas soil is on low terraces. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Absher sandy loam, 0 to 6 percent slopes; Uhl loam, 1 to 6 percent slopes; and Gelkie fine sandy loam, 2 to 8 percent slopes. Also included are small areas of Hoodie gravelly loam, 1 to 6 percent slopes, on terraces. Included areas

make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Venapass soil is very deep and poorly drained. It formed in alluvium derived from various sources. Typically, the surface is covered with a mat of decomposing organic material 2 inches thick. The surface layer is grayish brown loam 3 inches thick. The subsurface layer is gray loam 13 inches thick. The upper 14 inches of the underlying material also is gray loam. The lower part to a depth of 60 inches or more is gray gravelly coarse sandy loam.

Permeability is moderate in the Venapass soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight. The water table fluctuates between the surface and a depth of 18 inches from April through August. This soil is occasionally flooded for brief periods from April through June.

The Silas soil is very deep and moderately well drained. It formed in alluvium derived from various sources. Typically, the surface layer is very dark gray loam 3 inches thick. The subsurface layer is very dark grayish brown loam 13 inches thick. The upper 32 inches of the substratum is pale brown clay loam. The lower part to a depth of 60 inches or more is gray clay loam.

Permeability is moderate in the Silas soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. The seasonal high water table is at a depth of 36 to 60 inches from April through June.

This unit is used mainly as rangeland and wildlife habitat. It also is used for irrigated hay and pasture.

The potential plant community on the Venapass soil is mainly 35 to 50 percent Nebraska sedge, 10 to 20 percent northern sedge, 5 to 15 percent tufted hairgrass, and 5 to 15 percent willows. As the range condition deteriorates, willows and roses increase in abundance. As the range condition further deteriorates, unpalatable rushes or sedges and annual forbs invade. The potential plant community produces about 5,000 pounds of air-dry vegetation per acre in normal years. Production ranges from 6,000 pounds in favorable years to 3,500 pounds in unfavorable years.

The potential plant community on the Silas soil is mainly 25 to 35 percent rhizomatous wheatgrasses, 10 to 20 percent slender wheatgrass, 10 to 20 percent needlegrasses, and 5 to 10 percent big sagebrush. As the range condition deteriorates, big sagebrush and bluegrasses increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces

about 1,800 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,200 pounds in favorable years to 1,200 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by a short growing season and by the wetness of the Venapass soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion.

Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. The plants seeded on the Venapass soil should be those that can withstand wetness. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

If this unit is used for irrigated hay or pasture, the main limitations are a short growing season and wetness and flooding in areas of the Venapass soil. The wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Grazing during wet periods results in compaction of the surface layer, poor tilth, and excessive runoff. Applications of nitrogen and phosphate fertilizer improve the growth of forage plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and control erosion. Periodic mowing and clipping help to maintain a uniform plant cover and discourage selective grazing.

The Venapass soil is in capability subclasses IVw, irrigated, and Vw, nonirrigated. It is in the Wetland, 10- to 14-inch precipitation, High Plains Southeast range site. The Silas soil is in capability subclasses IVC, irrigated, and VIe, nonirrigated. It is in the Loamy Overflow, 10- to 14-inch precipitation, High Plains Southeast range site.

**220—Vonalee-Hiland complex, undulating.** This map unit is on fan aprons, hillslopes, and sand dunes. Slopes are 1 to 12 percent. Areas are irregular in shape and are 100 to 300 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,300 to 6,500 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 45 to 49 degrees F, and the frost-free period is 120 to 130 days.

This unit is about 45 percent Vonalee loamy sand, 1 to 12 percent slopes, and 35 percent Hiland sandy loam, 1 to 8 percent slopes. The Vonalee soil is on hillslopes, and the Hiland soil is on sand dunes and fan aprons. The components of this unit occur as areas so

intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of blowouts; Clarkelen sandy loam, 1 to 3 percent slopes, on flood plains; and Orpha sand, 5 to 20 percent slopes, on dunes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Vonalee soil is very deep and somewhat excessively drained. It formed in eolian deposits derived dominantly from sandstone. Typically, the surface layer is brown loamy sand 4 inches thick. The upper part of the subsoil is brown sandy loam 7 inches thick. The lower part is brown loamy sand 8 inches thick. The substratum to a depth of 60 inches or more is pale brown loamy sand.

Permeability is moderately rapid in the Vonalee soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Hiland soil is very deep and well drained. It formed in eolian deposits and alluvium derived from various sources. Typically, the surface layer is brown sandy loam 4 inches thick. The upper 11 inches of the subsoil is brown sandy clay loam. The next 5 inches is light yellowish brown sandy loam. The lower 2 inches is very pale brown loamy sand. The substratum to a depth of 60 inches or more is very pale brown sand.

Permeability is moderate in the Hiland soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Vonalee soil is mainly 35 to 50 percent needleandthread, 15 to 25 percent Indian ricegrass, 10 to 20 percent thickspike wheatgrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and forbs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,700 pounds in favorable years to 900 pounds in unfavorable years.

The potential plant community on the Hiland soil is mainly 20 to 30 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 10 to 20 percent Indian ricegrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and silver sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and

weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, wind erosion, and droughtiness. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control water erosion and wind erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. If the plant cover is removed during seeding, a cover crop is needed to keep windblown sand from damaging seedlings.

This unit is in capability subclass IVe, nonirrigated. The Vonalee soil is in the Sands, 10- to 14-inch precipitation, High Plains Southeast range site. The Hiland soil is in the Sandy, 10- to 14-inch precipitation, High Plains Southeast range site.

**221—Woosley-Decross-Starman association, rolling.** This map unit is on hills, mountains, fan aprons, and toe slopes. Slopes are 2 to 20 percent. Areas are irregular in shape and are 40 to 600 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,800 to 9,000 feet. The annual precipitation is 15 to 19 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 40 percent Woosley loam, 2 to 20 percent slopes; 30 percent Decross loam, 2 to 15 percent slopes; and 15 percent Starman gravelly loam, 5 to 20 percent slopes. The Woosley soil is on mountainsides, the Decross soil is on fan aprons and toe slopes, and the Starman soil is on hills and mountains.

Included in this unit are small areas of Bachus loam, 2 to 20 percent slopes, adjacent to the Decross soil; Chittum gravelly loam, 5 to 20 percent slopes; Crago cobbly loam, 2 to 15 percent slopes; and Pensore very channery loam, 5 to 20 percent slopes, adjacent to the Woosley and Starman soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Woosley soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from limestone. Typically, the surface layer is dark grayish brown loam 5 inches thick.

The upper 10 inches of the subsoil is dark brown clay loam. The next 4 inches is brown clay loam. The lower 12 inches is very pale brown gravelly loam. Limestone bedrock is at a depth of about 31 inches.

Permeability is moderate in the Woosley soil. Available water capacity also is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Decross soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is dark grayish brown loam 3 inches thick. The upper 7 inches of the subsoil is very dark grayish brown loam. The next 11 inches is very dark grayish brown clay loam. The next 17 inches is brown clay loam. The lower part to a depth of 60 inches or more is very pale brown loam.

Permeability is moderate in the Decross soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Starman soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from limestone. Typically, the surface layer is dark brown gravelly loam 3 inches thick. The upper 4 inches of the underlying material is pale brown very gravelly loam. The lower 8 inches is pale yellow very gravelly loam. Limestone bedrock is at a depth of about 15 inches.

Permeability is moderate in the Starman soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Woosley and Decross soils is mainly 10 to 25 percent Columbia needlegrass, 10 to 25 percent Kingspike fescue, 10 to 25 percent Idaho fescue, and 5 to 10 percent big sagebrush. As the range condition deteriorates, big sagebrush and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

The potential plant community on the Starman soil is mainly 10 to 25 percent Columbia needlegrass, 10 to 25 percent Idaho fescue, 10 to 25 percent Kingspike fescue, and 0 to 10 percent mountainmahogany. As the range condition deteriorates, big sagebrush and black

sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 850 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by a short growing season. It also is limited by the restricted rooting depth, droughtiness, and content of rock fragments in the Starman soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Range seeding by aerial broadcasting may not be suitable on the Starman soil because of the content of rock fragments and the restricted depth to bedrock. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Woosley and Decross soils are in capability subclass VIe, nonirrigated. They are in the Loamy, 15- to 19-inch precipitation, Foothills and Mountains East range site. The Starman soil is in capability subclass VIIe, nonirrigated. It is in the Shallow Loamy, 15- to 19-inch precipitation, Foothills and Mountains East range site.

**222—Worland-Oceanet-Persayo association, rolling.** This map unit is on hills and ridges. Slopes are 1 to 15 percent. Areas are irregular in shape and are 40 to 800 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,200 to 6,300 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit is about 40 percent Worland sandy loam, 1 to 10 percent slopes; 20 percent Oceanet sandy loam, 5 to 15 percent slopes; and 15 percent Persayo silty clay loam, 3 to 15 percent slopes. The Worland soil is on the side slopes of hills and ridges, the Oceanet soil is on the summit of hills and ridges and on shoulder slopes adjacent to exposures of sandstone, and the Persayo soil is on the summit of hills and ridges and on shoulder slopes adjacent to exposures of shale.

Included in this unit are small areas of Frisite fine sandy loam, 1 to 10 percent slopes; Griffy sandy loam, 1 to 10 percent slopes; Youngston clay loam, 1 to 6

percent slopes; and Wallson sandy loam, 1 to 10 percent slopes. These areas are on fan aprons. Also included are small areas of a soil that is similar to the Persayo soil but has slopes of 3 to 20 percent and is less than 10 inches deep over bedrock; a soil that is similar to the Oceanet soil but has slopes of 5 to 20 percent and is less than 10 inches deep over bedrock; and Rock outcrop on the summit of hills and ridges. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Worland soil is moderately deep and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is pale brown sandy loam 4 inches thick. The upper 17 inches of the underlying material also is pale brown sandy loam. The lower 13 inches is very pale brown fine sandy loam. Soft sandstone bedrock is at a depth of about 34 inches. In some areas the surface layer is loamy sand.

Permeability is moderately rapid in the Worland soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Oceanet soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from sandstone. Typically, the surface layer is light yellowish brown sandy loam 1 inch thick. The upper 7 inches of the underlying material is pale brown sandy loam. The lower 11 inches is pale brown fine sandy loam. Soft sandstone bedrock is at a depth of about 19 inches.

Permeability is moderately rapid in the Oceanet soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

The Persayo soil is shallow and well drained. It formed in residuum and slope alluvium derived dominantly from shale. Typically, the surface layer is light gray silty clay loam 1 inch thick. The upper 5 inches of the underlying material is light brownish gray silty clay loam. The lower 12 inches is light brownish gray silt loam. Soft shale bedrock is at a depth of about 18 inches.

Permeability is moderately slow in the Persayo soil. Available water capacity is low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Worland soil is mainly 30 to 50 percent needleandthread, 15 to 25 percent Indian ricegrass, 5 to 10 percent rhizomatous wheatgrasses, and 5 to 10 percent big sagebrush. As the range condition deteriorates, blue grama, threadleaf sedge, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear, annual grasses, and weeds invade. The potential plant community produces about 400 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 225 pounds in unfavorable years.

The potential plant community on the Oceanet soil is mainly 25 to 35 percent needleandthread, 15 to 25 percent rhizomatous wheatgrasses, 5 to 15 percent bluebunch wheatgrass, and 10 to 20 percent Indian ricegrass. As the range condition deteriorates, threadleaf sedge, blue grama, forbs, and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 250 pounds of air-dry vegetation per acre in normal years. Production ranges from 350 pounds in favorable years to 125 pounds in unfavorable years.

The potential plant community on the Persayo soil is mainly 20 to 30 percent rhizomatous wheatgrasses, 5 to 15 percent bottlebrush squirreltail, 5 to 15 percent Indian ricegrass, and 0 to 10 percent gardner saltbush. As the range condition deteriorates, big sagebrush and birdfoot sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 250 pounds of air-dry vegetation per acre in normal years. Production ranges from 350 pounds in favorable years to 125 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and droughtiness and by the restricted rooting depth in the Oceanet and Persayo soils. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control water erosion and wind erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include critical area planting, fencing, watering facilities, and wildlife habitat management. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Worland soil is in capability subclass VIe, nonirrigated. It is in the Sandy, 5- to 9-inch precipitation, Wind River Basin range site. The Oceanet and Persayo soils are in capability subclass VIIe, nonirrigated. The Oceanet soil is in the Shallow Sandy, 5- to 9-inch

precipitation, Wind River Basin range site. The Persayo soil is in the Shallow Clayey, 5- to 9-inch precipitation, Wind River Basin range site.

**223—Youga-Quander complex, 2 to 25 percent slopes.** This map unit is on mountains. Areas are irregular in shape and are 20 to 640 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,500 to 9,000 feet. The annual precipitation is 15 to 19 inches, the average annual air temperature is 33 to 41 degrees F, and the frost-free period is 60 to 90 days.

This unit is about 55 percent Youga loam, 2 to 25 percent slopes, and 30 percent Quander cobbly loam, 5 to 25 percent slopes. The Youga soil is on the foot slopes of mountains, and the Quander soil is on the back slopes and foot slopes of mountains. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Ansel sandy loam, 5 to 25 percent slopes; Onason sandy loam, 5 to 25 percent slopes, on the summit of ridges; and a soil that is similar to the Youga soil but is moderately deep, is light colored in the surface layer and in the upper part of the subsoil, has slopes of 3 to 15 percent, and is on hillslopes. Also included are small areas of a soil that is similar to the Quander soil but is moderately deep. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Youga soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is dark grayish brown loam 3 inches thick. The upper 11 inches of the subsoil is brown loam. The lower 7 inches is yellowish brown sandy clay loam. The substratum to a depth of 60 inches or more is very pale brown sandy clay loam that has a few thin strata of sandy loam.

Permeability is moderate in the Youga soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Quander soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, 30 percent of the surface is covered with gravel, cobbles, and stones. The surface layer is dark gray cobbly loam 3 inches thick. The upper 11 inches of the subsoil is grayish brown very cobbly sandy clay loam. The lower 29 inches is brownish yellow very cobbly sandy clay loam. The substratum to a depth of 60 inches or more is brownish yellow very cobbly loam.

Permeability is moderate in the Quander soil. Available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Youga soil is mainly 10 to 20 percent bluebunch wheatgrass, 5 to 10 percent Griffith wheatgrass, 10 to 20 percent Idaho fescue, 5 to 10 percent prairie junegrass, and 5 percent big sagebrush. As the range condition deteriorates, threadleaf sedge, big sagebrush, and rabbitbrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,000 pounds in favorable years to 800 pounds in unfavorable years.

The potential plant community on the Quander soil is mainly 20 to 30 percent bluebunch wheatgrass, 10 to 20 percent Idaho fescue, 5 to 10 percent western wheatgrass, and 5 percent big sagebrush. As the range condition deteriorates, threadleaf sedge and big sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and undesirable forbs invade. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,700 pounds in favorable years to 800 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by a short growing season and by the content of rock fragments in the Quander soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control water erosion and wind erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Areas where brush is removed should have enough ground cover remaining to prevent excessive erosion. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Because of the rock fragments on the surface of the Quander soil, broadcasting is the best seeding method. Access by livestock is limited in the steeper areas. As a result, the less sloping areas tend to be overgrazed. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VIe, nonirrigated.

The Youga soil is in the Loamy, 15- to 19-inch precipitation, Foothills and Mountains Southeast range site. The Quander soil is in the Coarse Upland, 15- to 19-inch precipitation, Foothills and Mountains Southeast range site.

**224—Youngston-Effington loams, 0 to 6 percent slopes.** This map unit is in drainageways. Areas are irregular in shape and are 40 to 800 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,200 to 6,300 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit is about 40 percent Youngston loam, 0 to 6 percent slopes, and 40 percent Effington loam, 0 to 3 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Apron sandy loam, 1 to 10 percent slopes; Birdsley sandy clay loam, 0 to 10 percent slopes, on hillslopes; Frisite loam, 2 to 8 percent slopes; and Lostwells sandy clay loam, 1 to 5 percent slopes. Also included are small areas of Fluvaquents, 0 to 3 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Youngston soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is light yellowish brown loam 3 inches thick. The underlying material to a depth of 60 inches or more is light olive brown clay loam stratified with thin lenses of fine sandy loam, sandy clay loam, and loam.

Permeability is moderately slow in the Youngston soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Effington soil is very deep and well drained. It formed in alluvium derived dominantly from sodic shale. Typically, the surface layer is pale brown loam 4 inches thick. The upper 5 inches of the subsoil is dark yellowish brown, sodium-affected clay loam. The next 7 inches is yellowish brown, sodium-affected clay. The next 34 inches is yellowish brown and light yellowish brown clay loam. The lower part to a depth of 60 inches or more is light yellowish brown sandy loam.

Permeability is very slow in the Effington soil. Available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. This soil is subject to rare flooding.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Youngston soil is mainly 25 to 45 percent rhizomatous wheatgrasses, 15 to 25 percent bottlebrush squirreltail, 5 to 10 percent Indian ricegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, blue grama, birdfoot sagebrush, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear, annual grasses, and weeds invade. The potential plant community produces about 300 pounds of air-dry vegetation per acre in normal years. Production ranges from 500 pounds in favorable years to 200 pounds in unfavorable years.

The potential plant community on the Effington soil is mainly 15 to 25 percent alkali sacaton, 10 to 25 percent basin wildrye, 5 to 15 percent western wheatgrass, and 5 to 15 percent greasewood. As the range condition deteriorates, greasewood and inland saltgrass increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,600 pounds in favorable years to 700 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and by alkalinity in the Effington soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

The Youngston soil is in capability subclass VIe, nonirrigated. It is in the Clayey, 5- to 9-inch precipitation, Wind River Basin range site. The Effington soil is in capability subclass VIi, nonirrigated. It is in the Saline Lowland, 5- to 9-inch precipitation, Wind River Basin range site.

**225—Youngston-Lostwells-Apron complex, 0 to 3 percent slopes.** This map unit is on flood plains, terraces, and fan aprons. Areas are long and narrow and are 5 to 800 acres in size. The native vegetation is mainly grasses and shrubs and scattered trees. Elevation is 4,800 to 6,200 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 120 to 130 days.

This unit is about 35 percent Youngston loam, occasionally flooded, 0 to 3 percent slopes; 30 percent Lostwells loam, 0 to 3 percent slopes; and 20 percent Apron sandy loam, 0 to 3 percent slopes. The Youngston soil is on flood plains, the Lostwells soil is on terraces, and the Apron soil is on fan aprons. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Binton clay loam, 0 to 3 percent slopes; Effington loam, 0 to 3 percent slopes; Fluvaquents, 0 to 3 percent slopes; and Riverwash adjacent to the Youngston and Lostwells soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Youngston soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown loam 6 inches thick. The underlying material to a depth of 60 inches or more is brown and yellowish brown loam stratified with lenses of fine sandy loam, loam, and clay loam. In some areas the surface layer is clay loam.

Permeability is moderately slow in the Youngston soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. This soil is occasionally flooded for brief periods from February through August.

The Lostwells soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is brown loam 2 inches thick. The subsurface layer is grayish brown loam 3 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown sandy clay loam stratified with lenses of clay loam and sandy loam.

Permeability is moderate in the Lostwells soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Apron soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown sandy loam 4 inches thick. The underlying material to a depth of 60 inches or more also is pale brown sandy loam. In some areas the surface layer is loam or fine sandy loam.

Permeability is moderately rapid in the Apron soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland and wildlife

habitat. It also is used for irrigated hay and pasture.

The potential plant community on the Youngston soil is mainly 15 to 25 percent alkali sacaton, 10 to 25 percent basin wildrye, 5 to 15 percent western wheatgrass, and 10 to 20 percent greasewood. As the range condition deteriorates, greasewood and inland saltgrass increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,600 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Lostwells soil is mainly 10 to 20 percent Indian ricegrass, 20 to 40 percent rhizomatous wheatgrasses, 10 to 20 percent needleandthread, and 5 to 15 percent big sagebrush. As the range condition deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear, annual grasses, and weeds invade. The potential plant community produces about 400 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 225 pounds in unfavorable years.

The potential plant community on the Apron soil is mainly 30 to 50 percent needleandthread, 15 to 25 percent Indian ricegrass, 5 to 10 percent rhizomatous wheatgrasses, and 5 to 10 percent big sagebrush. As the range condition deteriorates, blue grama, threadleaf sedge, yucca, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 400 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 225 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, by the content of salts in the Youngston soil, and by wind erosion on the Apron soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Because of the low precipitation, the seeds should be planted when the soils contain more than the normal amount of moisture.

This unit is well suited to hay and pasture. The main limitations are the slope and a short growing season. Applications of nitrogen and phosphate fertilizer improve

the growth of forage plants. Proper grazing practices, rotation grazing, weed control, and applications of fertilizer are needed to ensure the maximum quality of forage. Periodic mowing and clipping help to maintain a uniform plant cover and discourage selective grazing.

Irrigation water can be applied by the contour ditch, furrow, or sprinkler method. To prevent overirrigation and the leaching of plant nutrients and to control water erosion, applications of irrigation water should be adjusted to the available water capacity and rate of water intake in the soils. Land leveling helps to ensure a uniform application of water.

This unit is in capability subclasses IIIe, irrigated, and VIe, nonirrigated. The Youngston soil is in the Saline Lowland, 5- to 9-inch precipitation, Wind River Basin range site. The Lostwells soil is in the Loamy, 5- to 9-inch precipitation, Wind River Basin range site. The Apron soil is in the Sandy, 5- to 9-inch precipitation, Wind River Basin range site.

**226—Youngston-Lostwells complex, 1 to 3 percent slopes.** This map unit is on terraces and fan aprons. Areas are irregular in shape and are 5 to 640 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,200 to 6,200 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 120 to 130 days.

This unit is about 50 percent Youngston clay loam, 1 to 3 percent slopes, and 35 percent Lostwells loam, 1 to 3 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Apron sandy loam, 1 to 5 percent slopes; Binton clay loam, 1 to 3 percent slopes; and Muff fine sandy loam, 1 to 8 percent slopes. Also included are small areas of Frisite loam, 1 to 3 percent slopes, and Uffens loam, 1 to 8 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Youngston soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is pale brown clay loam 4 inches thick. The underlying material to a depth of 60 inches or more is pale brown clay loam stratified with thin lenses of fine sandy loam and sandy clay loam.

Permeability is moderately slow in the Youngston soil. Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Lostwells soil is very deep and well drained. It formed in alluvium derived from various sources.

Typically, the surface layer is pale olive loam 11 inches thick. The underlying material to a depth of 60 inches or more is pale olive sandy clay loam stratified with a few thin lenses of sandy loam, loam, and clay loam.

Permeability is moderate in the Lostwells soil.

Available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland and wildlife habitat. It also is used for irrigated hay and pasture.

The potential plant community on the Youngston soil is mainly 25 to 45 percent rhizomatous wheatgrasses, 15 to 25 percent bottlebrush squirreltail, 5 to 10 percent Indian ricegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, blue grama, birdfoot sagebrush, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 300 pounds of air-dry vegetation per acre in normal years. Production ranges from 500 pounds in favorable years to 200 pounds in unfavorable years.

The potential plant community on the Lostwells soil is mainly 30 to 50 percent Indian ricegrass, 20 to 40 percent rhizomatous wheatgrasses, 10 to 20 percent needleandthread, and 5 to 15 percent big sagebrush. As the range condition deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 400 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 225 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for natural seeding to occur. Because of the low precipitation, the seeds should be planted when the soils contain more than the normal amount of moisture.

This unit is well suited to irrigated hay and pasture. The main limitation is the slope. Applications of nitrogen and phosphate fertilizer improve the growth of forage plants. Proper grazing practices, rotation grazing, weed control, and applications of fertilizer are needed to

ensure the maximum quality of forage. Periodic mowing and clipping help to maintain a uniform plant cover and discourage selective grazing. Proper stocking rates and restricted grazing during wet periods help to keep the pasture in good condition and control erosion.

Irrigation water can be applied by the border, contour ditch, or sprinkler method. To prevent overirrigation and the leaching of plant nutrients and to control water erosion, applications of irrigation water should be adjusted to the available water capacity and rate of water intake in the soils. Land leveling helps to ensure a uniform application of water.

This unit is in capability subclasses IIIe, irrigated, and VIe, nonirrigated. The Youngston soil is in the Clayey, 5- to 9-inch precipitation, Wind River Basin range site. The Lostwells soil is in the Loamy, 5- to 9-inch precipitation, Wind River Basin range site.

**227—Youngston-Persayo loams, rolling.** This map unit is in drainageways and on low terraces, hills, and ridges. Slopes are 1 to 15 percent. Areas are irregular in shape and are 80 to 320 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,200 to 6,300 feet. The annual precipitation is 5 to 9 inches, the average annual air temperature is 43 to 49 degrees F, and the frost-free period is 110 to 130 days.

This unit is about 60 percent Youngston loam, 1 to 5 percent slopes, and 25 percent Persayo loam, 8 to 15 percent slopes. The Youngston soil is in drainageways and on low terraces, and the Persayo soil is on hills and ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Apron sandy loam, 1 to 10 percent slopes; Frisite fine sandy loam, 1 to 8 percent slopes; and Lostwells sandy clay loam, 1 to 5 percent slopes, all of which are adjacent to the Youngston soil. Also included are small areas of Birdsley sandy clay loam, 1 to 15 percent slopes; Oceanet sandy loam, 5 to 15 percent slopes; and Worland sandy loam, 1 to 15 percent slopes, all of which are adjacent to the Persayo soil. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Youngston soil is very deep and well drained. It formed in alluvium derived from various sources. Typically, the surface layer is grayish brown loam 4 inches thick. The underlying material to a depth of 60 inches or more is very pale brown loam stratified with thin lenses of fine sandy loam, sandy clay loam, and clay loam.

Permeability is moderately slow in the Youngston soil. Available water capacity is high. The effective

rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Persayo soil is very shallow or shallow and is well drained. It formed in residuum and slope alluvium derived dominantly from shale. Typically, the surface layer is light brownish gray loam 2 inches thick. The underlying material is light brownish gray and olive gray clay loam 8 inches thick. Soft shale bedrock is at a depth of about 10 inches.

Permeability is moderately slow in the Persayo soil. Available water capacity is low. The effective rooting depth is 4 to 20 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on the Youngston soil is mainly 25 to 45 percent rhizomatous wheatgrasses, 15 to 25 percent bottlebrush squirreltail, 5 to 10 percent Indian ricegrass, and 5 to 10 percent big sagebrush. As the range condition deteriorates, blue grama, birdfoot sagebrush, and big sagebrush increase in abundance. As the range condition further deteriorates, pricklypear, annual grasses, and weeds invade. The potential plant community produces about 300 pounds of air-dry vegetation per acre in normal years. Production ranges from 500 pounds in favorable years to 200 pounds in unfavorable years.

The potential plant community on the Persayo soil is mainly 20 to 30 percent rhizomatous wheatgrass, 5 to 15 percent bottlebrush squirreltail, 5 to 15 percent Indian ricegrass, and 0 to 10 percent gardner saltbush. As the range condition deteriorates, big sagebrush and birdfoot sagebrush increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 250 pounds of air-dry vegetation per acre in normal years. Production ranges from 350 pounds in favorable years to 125 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation and by the restricted rooting depth and droughtiness in the Persayo soil. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VIe, nonirrigated. The Youngston soil is in the Clayey, 5- to 9-inch precipitation, Wind River Basin range site. The Persayo soil is in the Shallow Clayey, 5- to 9-inch precipitation, Wind River Basin range site.

**228—Zeomont loamy sand, hilly.** This very deep, excessively drained soil is on dunes. It formed in sandy eolian material derived from various sources. Slopes are 2 to 35 percent. Areas are irregular in shape and are 10 to 1,000 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 7,300 to 8,000 feet. The annual precipitation is 10 to 14 inches, the average annual air temperature is 39 to 45 degrees F, and the frost-free period is 90 to 110 days.

Included in this unit are small blowouts; Bosler sandy loam, 2 to 8 percent slopes, on fan aprons; Ryan Park sandy loam, 1 to 8 percent slopes, on fan aprons; Ryark sandy loam, 1 to 10 percent slopes, on fan aprons; and Cushool sandy loam, 2 to 25 percent slopes, on hillslopes. Included areas make up about 15 percent of the total acreage.

Typically, the surface layer is grayish brown loamy sand 7 inches thick. The underlying material to a depth of 60 inches or more is very pale brown sand.

Permeability is rapid in the Zeomont soil. Available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland. It also is used for wildlife habitat.

The potential plant community on this unit is mainly 35 to 50 percent needleandthread, 15 to 25 percent Indian ricegrass, 10 to 20 percent thickspike wheatgrass, and 5 to 10 percent silver sagebrush. As the range condition deteriorates, threadleaf sedge and forbs increase in abundance. As the range condition further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,700 pounds in favorable years to 900 pounds in unfavorable years.

The production of vegetation suitable for grazing is limited by low precipitation, droughtiness, wind erosion, and a short growing season. Proper grazing use and deferred grazing are needed to maintain an adequate plant cover and to control wind erosion and water erosion. Additional management practices may be needed on rangeland that is in an undesirable condition. These practices include brush control, critical area planting, fencing, watering facilities, and wildlife habitat management. Range seeding may be needed if the amount of desirable vegetation is not sufficient for

natural seeding to occur. Grazing should be delayed until the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit is in capability subclass VIe, nonirrigated. It is in the Sands, 10- to 14-inch precipitation, High Plains Southeast range site.

**229—Dumps, mine.** This unit occurs as areas of waste rock derived mainly from uranium mines and quarries. It is used mainly for wildlife habitat.

This unit is in capability class VIII, nonirrigated. It is not assigned to a range site.

**230—Pits, gravel.** This unit consists mainly of open excavations from which gravel has been removed and in which rock or other material is exposed. Also included are areas of mine pits and quarry pits. The unit is used mainly for wildlife habitat.

This unit is capability class VIII, nonirrigated. It is not assigned to a range site.

# Prime Farmland

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In this section, prime farmland is defined and the soils in the survey area that are considered prime farmland are listed.

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, seed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. An adequate moisture supply and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils either are used for food or fiber or are available for these uses. Urban or built-up land and water areas cannot be considered prime farmland.

The prime farmland in this survey area receives an adequate and dependable supply of moisture from irrigation. The temperature and length of growing season are favorable, and the level of acidity or alkalinity is acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not

excessively erodible or saturated with water for long periods and are not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent.

Soils that are droughty may qualify as prime farmland soils where this limitation is overcome by irrigation. Onsite evaluation is necessary to determine the effectiveness of irrigation systems. More information about the criteria for prime farmland can be obtained at the local office of the Soil Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

About 8,155 acres, or 0.31 percent of the survey area, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available.

The following map units meet the soil requirements for prime farmland where irrigated. The location of each map unit is shown on the detailed soil maps at the back of this publication. Soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

104	Almy loam, 0 to 6 percent slopes
185	Poposhia loam, 1 to 6 percent slopes
207	Sinkson-Almy sandy clay loams, 0 to 6 percent slopes

