SOIL SURVEY OF

Larimer County Area, Colorado

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Major fieldwork for this soil survey was completed in the period 1962–74. Soil names and descriptions were approved in 1975. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1975. This survey was made cooperatively by the Soil Conservation Service and Forest Service and the Colorado Agricultural Experiment Station. It is part of the technical assistance furnished to the Fort Collins and Big Thompson Soil Conservation Districts.

Soil maps in this survey may be copied without permission, but any enlargement of these maps could cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms

For example, soils that have a slight limitation for a given use can be colored green, those with

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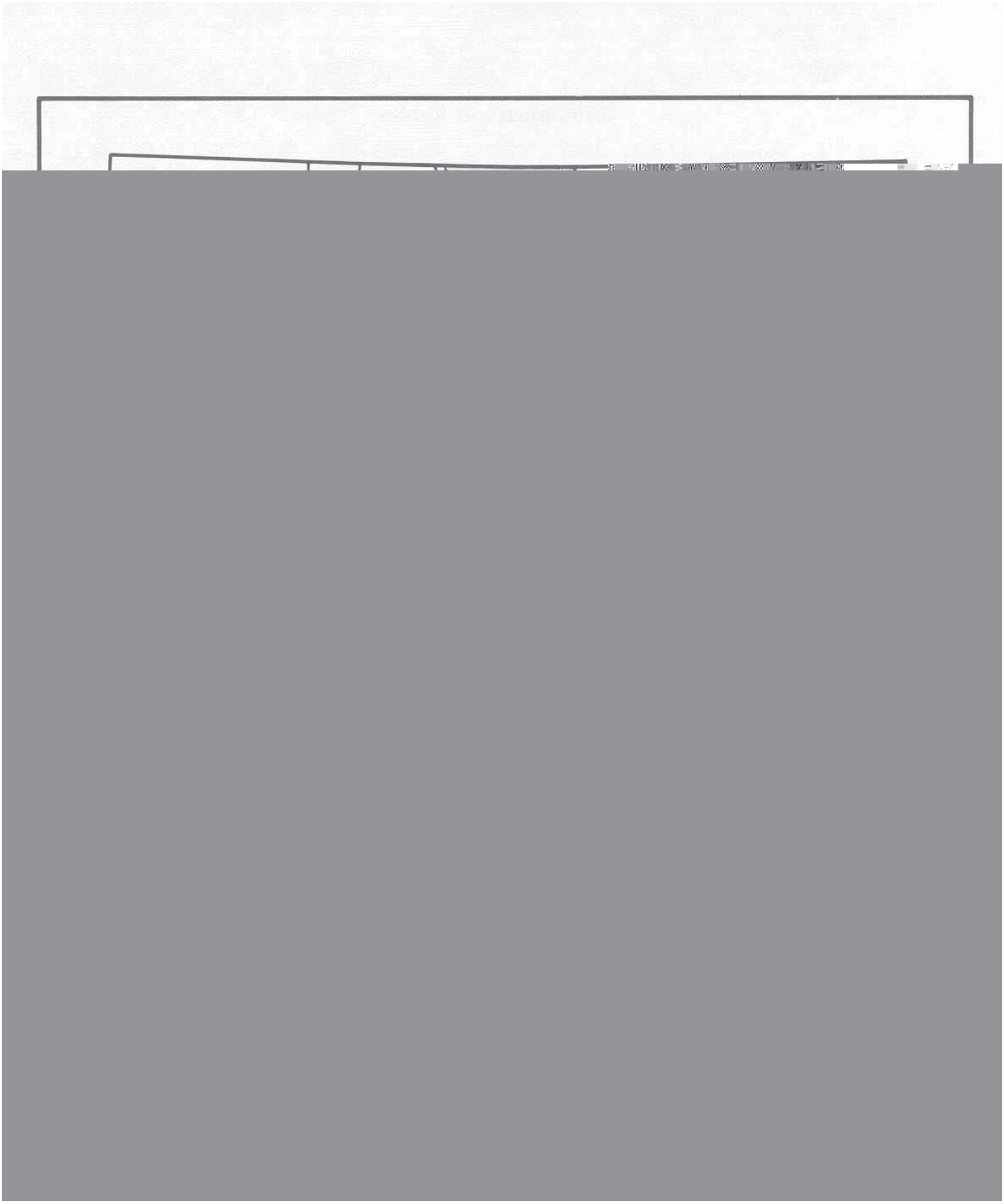


SOIL SURVEY OF LARIMER COUNTY AREA, COLORADO

BY DONALD C. MORELAND, SOIL CONSERVATION SERVICE

SOILS SURVEYED BY ORVILLE A. PARSONS, CHARLES P. PRENTISS, RAY L. MILES, AND DONALD C. MORELAND, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE AND FOREST SERVICE, IN COOPERATION WITH THE COLORADO AGRICULTURAL EXPERIMENT STATION

LARIMER COUNTY AREA is in the north-central part of Colorado (see map on facing page). The total area is about 954,240 acres. The eastern part of the Area consists of rolling plains and valleys. It is used mainly for irrigated and dryfarmed crops and

tant characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Fort Collins and LaPorte, for example, are the names of two soil seri[redacted]

scribed in the survey, but they are called land types and are given descriptive names. Rock outcrop is an example. Some places have soils so variable that they

Areas Dominated by Cold Soils on Mountains

These soils are on mountainsides, uplands, terraces,

ner of the survey area. Elevation ranges from 8,000 to 8,500 feet. Mean annual air temperature ranges from about 42° to 44° F, and annual precipitation ranges from about 13 to 17 inches. The native vegetation is mainly grasses and shrubs.

The association makes up about 2 percent of the survey area. It is about 50 percent Thiel soils and 25 percent Driggs soils. The remaining 25 perc[redacted]

4. Pendergrass-Miracle-Clergern association

Shallow to deep, nearly level to moderately steep, well drained or somewhat excessively drained fine sandy loams that formed in materials weathered from sandstone and in alluvium; on uplands and in valleys

This association is around Chimney Rock in the [redacted]

ranges from 14 to 18 inches. The native vegetation is mainly mid grasses and ponderosa pine.

livestock grazing, forestry, recreation, and wildlife habitat.

gravelly sandy clay loam. The underlying material is weathered granite at a depth of about 13 inches.

Ratake soils are nearly level to very steep and are well drained or somewhat excessively drained. The surface layer and subsoil are channery loam. Schist or granite is at a depth of about 15 inches.

Breece soils are deep and are on alluvial fans and in valleys. Farnuf, Elbeth, and Trag soils are deep and are on mountainsides and valleysides. Moen soils are moderately deep and are on uplands and valleysides. Rock outcrop is areas of exposed bedrock.

The soils in this association are used mainly for livestock grazing. Some areas are used for recreation and wildlife habitat.

Areas Dominated by Warm Soils on Foothills

These soils are on uplands, high te[illegible]

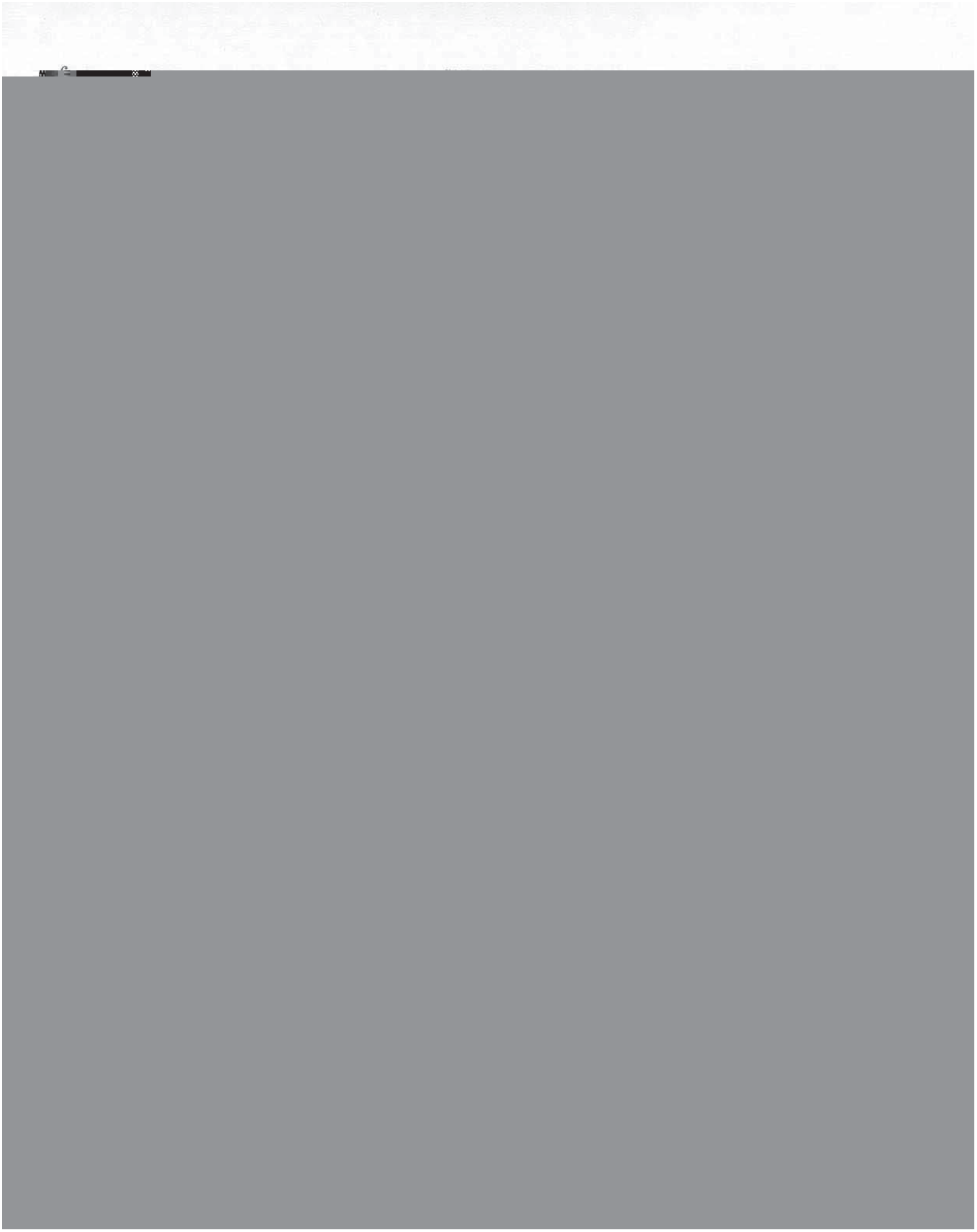
soils are deep and gravelly and are on uplands and old terraces.

The soils in this association are used mainly for range, but some areas are used for irrigated or dry-farmed crops.

8. Haplustolls-Baller-Rock outcrop association

Shallow to deep, strongly sloping to steep, well drained mainly loams, clay loams, and stony sandy loams that formed in material weathered from sandstone, and Rock outcrop; on uplands

This association is in the foothills, mainly in the east-central part of the survey area. Elevation ranges from 5,200 to 6,000 feet. Mean annual air temperature is 46° to 50° F, and annual precipitation ranges from about 15 to 17 inches. The native vegetation is mainly mid grasses and shrubs. Ponderosa pine are in some



races in the eastern part of the survey area. They are shallow to deep, nearly level to moderately steep, well drained to somewhat poorly drained, and moderately fine textured to moderately coarse textured. The average annual precipitation ranges from about 13 to 15 inches. The frost-free season ranges from 135 to 150 days.

These soils are mainly used for irrigated and dryfarmed crops, but some areas are used for range and pasture. The main irrigated crops are sugar beets, corn, barley, alfalfa, dry beans, and wheat. The main dryfarmed crop is wheat, but barley is also grown. The native vegetation is mainly short grasses.

12. Altvan-Larimer-Stoneham association

Deep, nearly level to strongly sloping, well drained loams and fine sandy loams that formed in alluvium and in upland deposits; on uplands, benches, and fans

This association is mainly in the northeastern part of the survey area north of Fort Collins. Elevation ranges from 5,100 to 6,200 feet. Mean annual air temperature ranges from 48° to 50° F, and annual precipitation ranges from 13 to 15 inches. The native vegetation is mainly short grasses.

The association makes up about 8 percent of the survey area. It is about 30 percent Altvan soils, 15

The underlying material is sandy loam. Sandstone is subsoil is silty clay loam. The underlying m

well drained. The surface layer and subsoil are clay loam. The underlying material is clay loam or silty lying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar

TABLE 1.—*Acreage and proportionate extent of the soils*

Soil	Acres	Percent	Soil	Acres	Percent
Altvan loam, 0 to 3 percent slopes	11,300	1.2	Kim loam, 5 to 9		

TABLE 1.—*Acreage and proportionate extent of the soils*—Continued

Soil	Acres	Percent	Soil	Acres	Percent
Thiel gravelly sandy loam, 5 to 25			Wetmore-Boyle-Moen c		

sloping to strongly sloping soil is on terrace edges, fans, and benches. This soil has a profile similar to the one described as representative of the series, but the combined thickness of the surface layer and subsoil is about 18 to 19 inches.

Included with this soil in mapping are some areas of soils that are more sloping and some areas of soils that have a surface layer of sandy loam. Also included are small areas of Larimer, Stoneham, and Larim soils.

Runoff is medium, and the hazard of erosion is moderate to severe.

This soil is suited to wheat and barley under dryland management. If irrigated, it is also suited to alfalfa. It is well suited to pasture and native grasses. Capability units IVe–1, irrigated, and IVe–3, dryland; Loamy Plains range site; windbreak suitability group 1.

3—Altvan-Satanta loams, 0 to 3 percent slopes. This complex consists of nearly level soils on terraces and high benches. It is about 45 percent Altvan loam and about 30 percent Satanta loam. The soils are inter-

Aquepts, Loamy

5—Aquepts, loamy. These nearly level or gently sloping, poorly drained soils are in depressional areas on uplands, along drainageways, and on side slopes below large canals. The surface layer is fine sandy loam, loam, or clay loam. The underlying layer is mainly loam or clay loam extending to a depth of 40 to 60 inches or more. A water table is at or near the surface in spring and summer.

Included with these soils in mapping are a few small areas of Stoneham, Fort Collins, and Kim soils and Nunn clay loam, wet.

Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

These soils are suited to pasture and native grasses. A few areas are used for hay. If drained, the soils are suited to crops. The main irrigated crops are barley, corn, sugar beets, and wheat. Capability units IIIw–1, irrigated, and Vw–1, dryland; Wet Meadow range site;

ture; hard, very friable; neutral; clear smooth boundary.

B2t—6 to 16 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium angular and

units IIIe–4, irrigated, and IIIe–8, dryland; Sandy Plains range site; windbreak suitability group 2.

Bainville Series

The Bainville series consists of moderately deep, well

Keith clay loam, Bainville sil[redacted]

C—10 to 60 inches; reddish brown (5YR 5/4) loam stratified with thin strata of sandy loam or clay loam, dark reddish brown (5YR 3/4) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable; calcareous; moderately alkaline.

The A horizon is loam, heavy sandy loam, or sandy clay loam and it is stratified in places. The C horizon is mainly loam, but it is stratified with sandy loam, fine sandy loam, and light clay loam. The A and C horizons range from mildly alkaline to moderately alkaline and are generally calcareous, but some strata are noncalcareous.

lar blocky structure; hard, friable; common medium and coarse distinct yellowish red (5YR 5/6) mottles; neutral; clear smooth boundary.

IIC1g—35 to 43 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 4/3) moist; massive; hard, very friable; common medium distinct yellowish red (5YR 5/6) mottles; neutral; clear wavy boundary.

IIIC2—43 to 60 inches; clean sand and gravel.

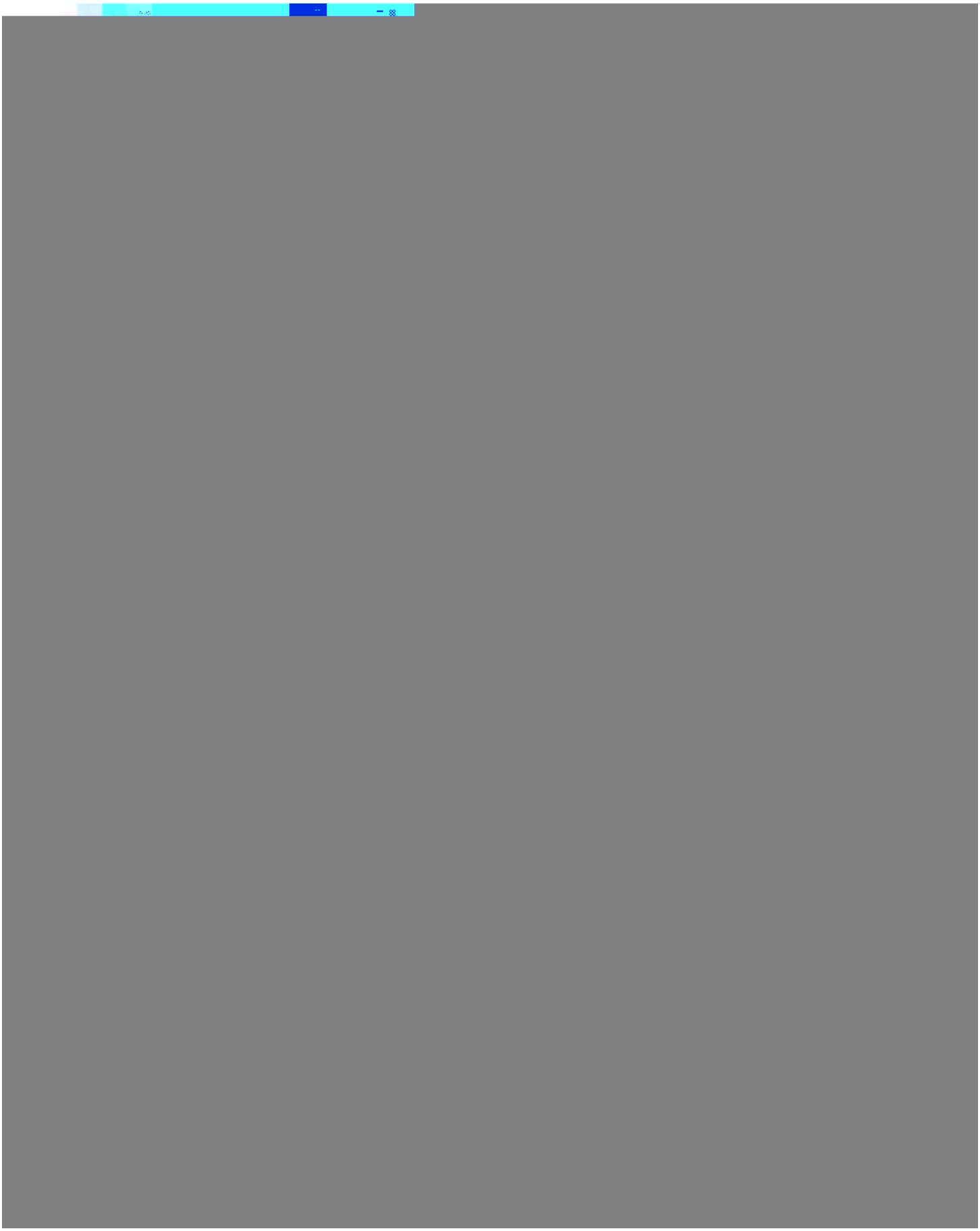
The A horizon is loam or clay loam 10 to 20 inches thick. A loam or clay loam B2g horizon is present in some places. Reaction is medium acid to neutral. Con-

firm; thin patchy clay films on peds; 25 percent gravel; neutral; clear smooth boundary.

B22t—10 to 13 inches; reddish brown (5YR 5/4) very gravelly sandy clay loam, dark red

but in which granite is at a depth of 20 to 24 inches; granite knobs and outcrops occur with these included soils.

Runoff is slow, and the hazard of water erosion is slight.



fine sandy loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; slightly hard, very friable; strongly effervescent; mildly alkaline; clear wavy boundary.

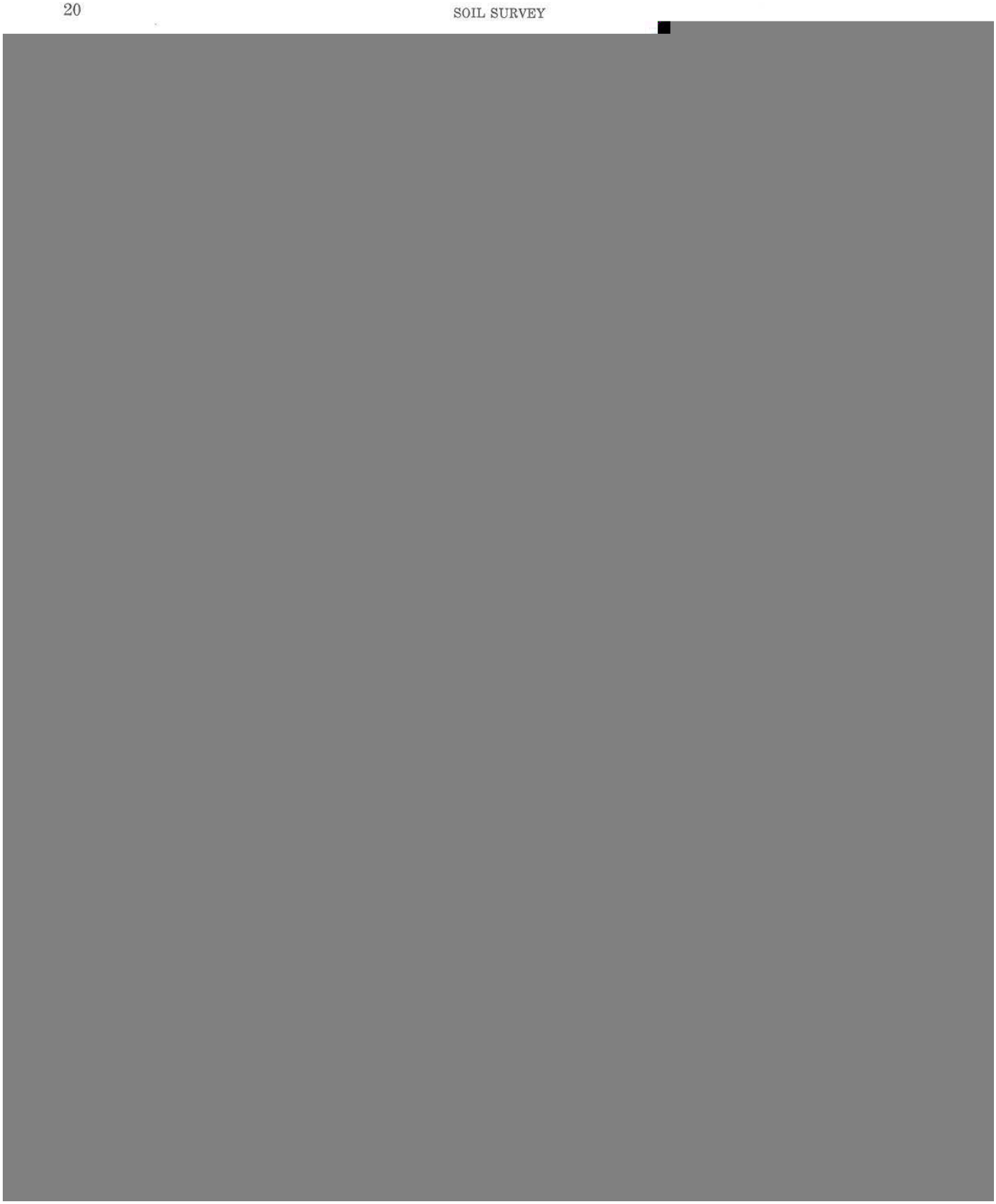
C2—30 to 60 inches; light reddish brown (5YR 6/4) fine sandy loam, reddish brown (5YR 4/4) moist; massive; slightly hard, very friable; strongly effervescent; mildly alkaline.

The A horizon is fine sandy loam, g[redacted]

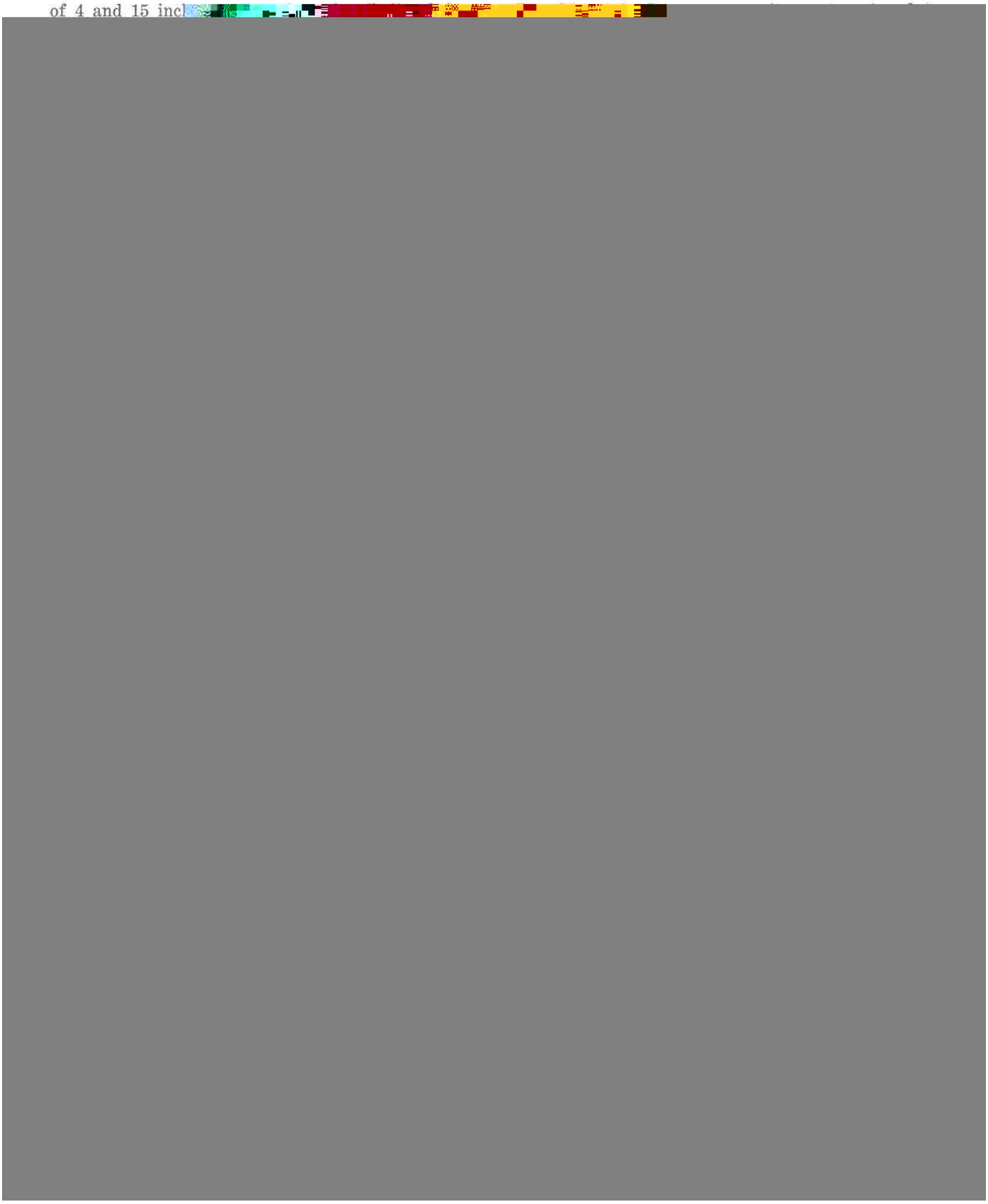
ture; hard, very friable; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—20 to 36 inches; light reddish brown (5YR 6/4) loam, reddish brown (5YR 5/4) moist; weak medium subangular blocky structure; very hard, very friable; violently effervescent; moderately alkaline; gradual smooth boundary.

C3—36 to 60 inches; yellowish red (5YR 5/6)



of 4 and 15 incl



loam, dark brown (7.5YR 4/4) moist; moderate to strong fine and medium subangular blocky structure; very hard, firm; thin

in native grass, 2,200 feet west and 250 feet south of the northeast corner of sec. 35, T. 12 N., R. 69 W.:

A1—0 to 4 inches; light brownish gray (2.5Y

4/3) moist; moderate coarse subangular blocky structure; very hard, friable; thin nearly continuous clay films on ped faces; mildly alkaline; clear wavy boundary.

B3ca—17 to 21 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; weak coarse subangular blocky structure; slightly hard, very friable; few thin patchy clay films on ped faces; violently effervescent

Rocky Loam range site, and Rock outcrop not assigned to a range site; not assigned to a windbreak suitability group.

Fluvaquents, Nearly Level

33—Fluvaquents, nearly level. This soil is on flood plains, low terraces, and bottom lands. The surface and underlying layers are extremely variable, range from sandy loam to clay loam, and are commonly

films on peds; noncalcareous; neutral; clear smooth boundary.

B2—8 to 18 inches; brown (10YR 5/3) heavy loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate fine subangular blocky; very hard, very friable; many thin patchy clay films on peds and in root channels and pores; noncalcareous; mildly alkaline; gradual smooth boundary.

inches thick. The combined thickness of the A and B horizons is 15 to 30 inches. The B2 horizon is loam to light clay loam.

34—Fort Collins loam, 0 to 1 percent slopes. This level soil is on terraces and fans. This soil has the profile described as representative of the series.

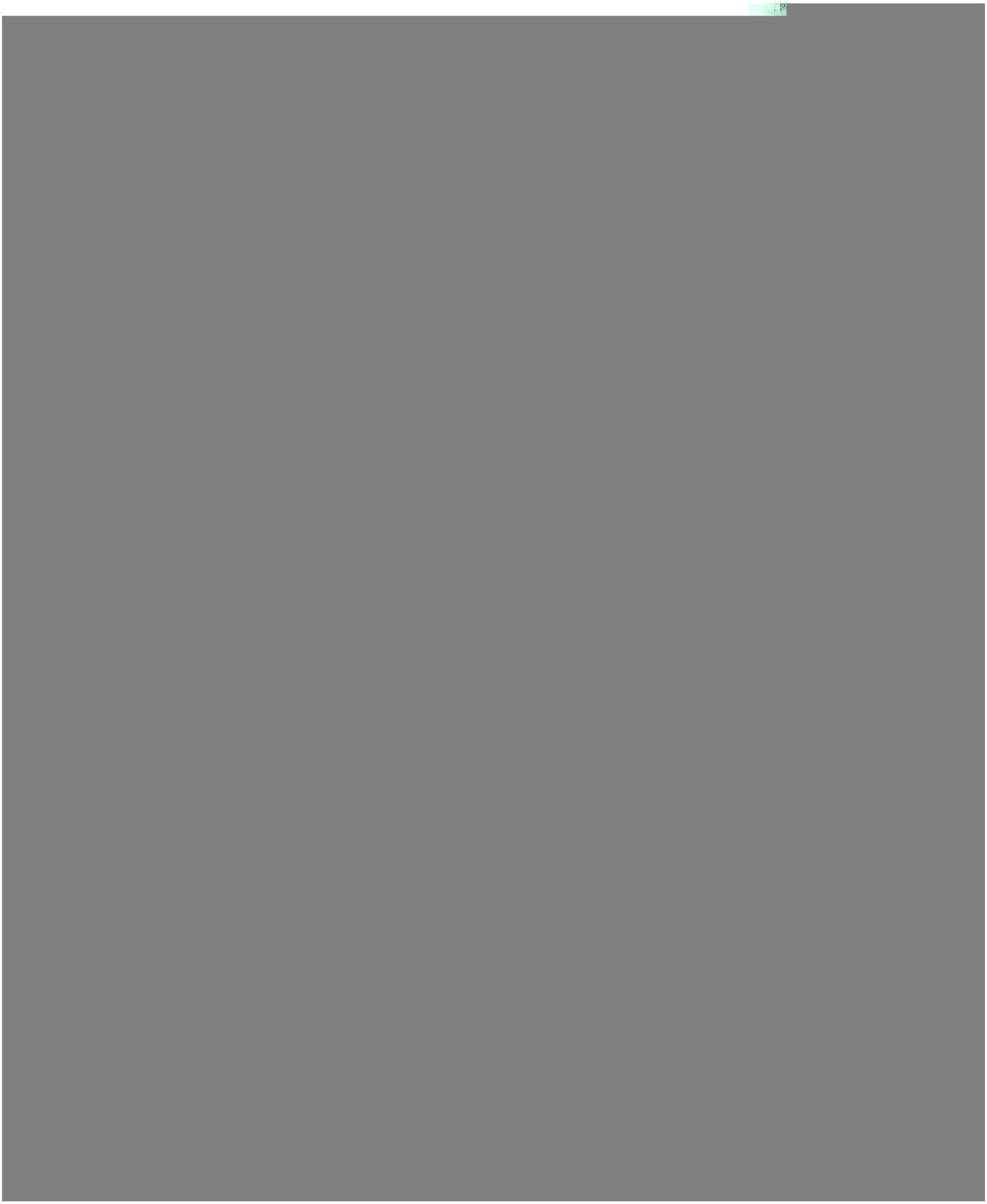
Included with this soil in mapping are a few small areas of soils that are more sloping. Also included are small areas of soils that have a surface layer of clay loam and small areas of Stoneham soils.

Runoff is slow, and the hazards of wind and water erosion are slight to moderate.

If irrigated, this soil is well suited to corn, sugar beets, alfalfa, barley, and dry beans. Under dryland management it is suited to wheat and barley. It is also well suited to pasture and native grasses. Capability

Permeability is moderate above a depth of about 36 inches and very rapid below that depth. The available water capacity is medium to high. Reaction is slightly acid above a depth of about 22 inches and neutral below that depth.

These soils are mainly used for irriga



3/4) moist; massive; hard, very friable; violently effervescent; streaks and small specks of calcium carbonate; moderately alkaline.

Thickness of the molli[illegible]

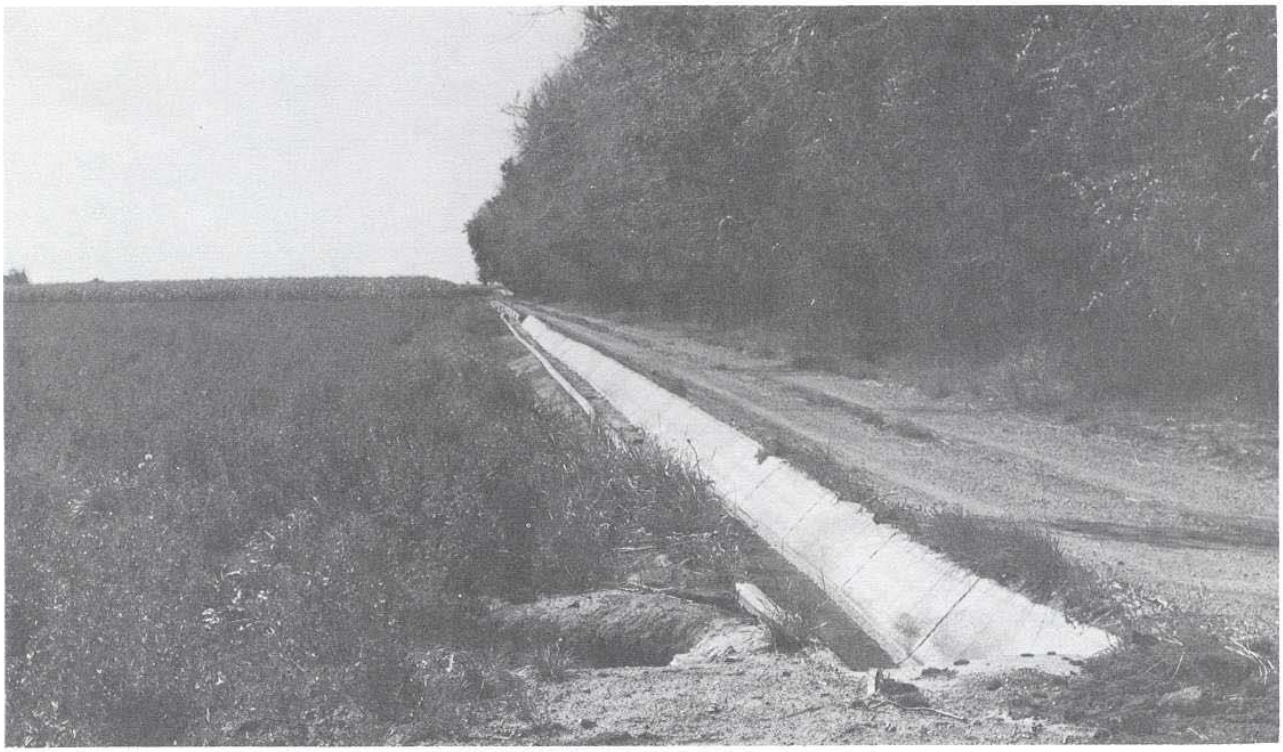


Figure 7.—Area of Garrett loam, 1 to 3 percent slopes; field of alfalfa on left, and concrete lined irrigation ditch and windbreak on right.

steep soils are on fans and lower side slopes of ridges in the foothills. The surface layer and subsurface layer are mainly loam or clay loam, but texture is extremely variable, often within short distances. Some areas of these soils have a cobbly and stony surface layer and subsurface layer. Content of cobbles ranges from 15 to 30 percent and content of stones ranges from 10 to 25 percent in these areas. Soil depth ranges from shallow to deep. A few areas of Rock outcrop are included in mapped areas.

Runoff is rapid, and the hazard of water erosion is moderate to severe. Gullies occur in places.

These soils are used for native grasses. Capability unit VIe–1, dryland; Loamy Foothill range site; not assigned to a windbreak suitability group.

Haplustolls-Rock Outcrop Complex, Steep

45—Haplustolls-Rock outcrop complex, steep. This complex consists of strongly sloping to steep soils and Rock outcrop. It is on colluvial slopes and hillsides. About 60 to 80 percent of the unit is extremely variable, dark colored soils that have a sandy loam, loam, or clay loam surface layer and subsurface layer. They more. About 20 to 40 percent of the mapped area is Rock outcrop. It is generally near the top and middle parts of the slopes, but it is intermingled throughout.

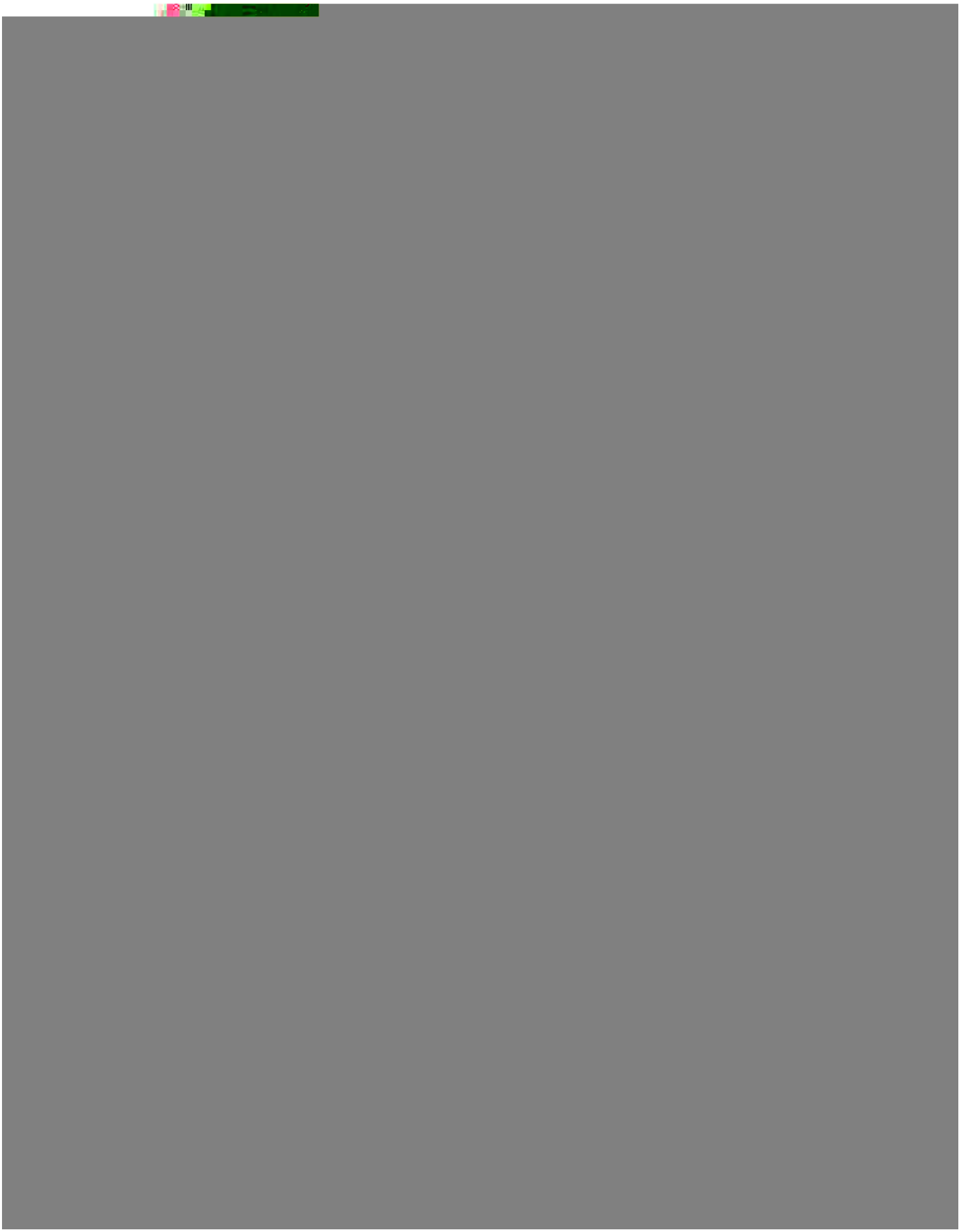
Runoff is medium to rapid, and the hazard of erosion is moderate to severe.

These soils are suited to native grasses. They are also used for wildlife habitat. Capability unit VIIe–1, dryland; Haplustolls in Rocky Foothill range site and Rock outcrop not assigned to a range site; not assigned to a windbreak suitability group.

Harlan Series

The Harlan series consists of deep, well drained soils that formed in alluvium weathered from reddish sandstone and shale. These soils are on terraces, fans, and valleysides. Elevation ranges from 5,200 to 6,000 feet. Slopes are 1 to 9 percent. The native vegetation is mainly blue grama, western and slender wheatgrass, Indian ricegrass, and fringed sage. Mean annual precipitation ranges from 13 to 15 inches, mean annual air temperature ranges from 48° to 50° F, and the frost-free season ranges from 135 to 150 days.

In a representative p[redacted]



Runoff is slow. The hazard of water erosion is slight, and the hazard of wind erosion is moderate.

If irrigated, this soil is suited to corn, barley, alfalfa, and wheat. Under dryland management it is

hard, firm; calcareous; moderately alkaline; clear smooth boundary.

B2—6 to 20 inches; light brownish gray (2.5Y 6/2) clay, [illegible]

that formed in [redacted]

A Cca horizon is absent in some profiles. The A and B horizons range from neutral to moderately alkaline.

51—Kildor clay loam, 0 to 6 percent slopes. This nearly level to strongly sloping soil is on uplands. This soil has the profile described as representative of the series.

Included with this soil in mapping are small areas of soils that have a surface layer of clay and small areas of soils in which gravel and cobbles are on the surface. Also included are a few small areas of soils in which shale is at a depth of less than 2

40 feet north of the southeast corner of the NE¼ sec. 36, T. 8 N., R. 69 W.:

Ap—0 to 7 inches; light yellowish brown (2.5Y 6/3) loam, olive brown (2.5Y 4/3) moist; moderate fine and very fine granular structure; soft, very friable; calcareous; mildly alkaline; clear smooth boundary.

C1—7 to 13 inches; pale yellow (2.5Y 7/3) loam, olive brown (2.5Y 4/3) moist; weak me-

dryland management it is suited to pasture and native grasses. Capability units IIIe–2, irrigated, and IVe–3, dryland; Loamy Plains range site; windbreak suitability group 1.

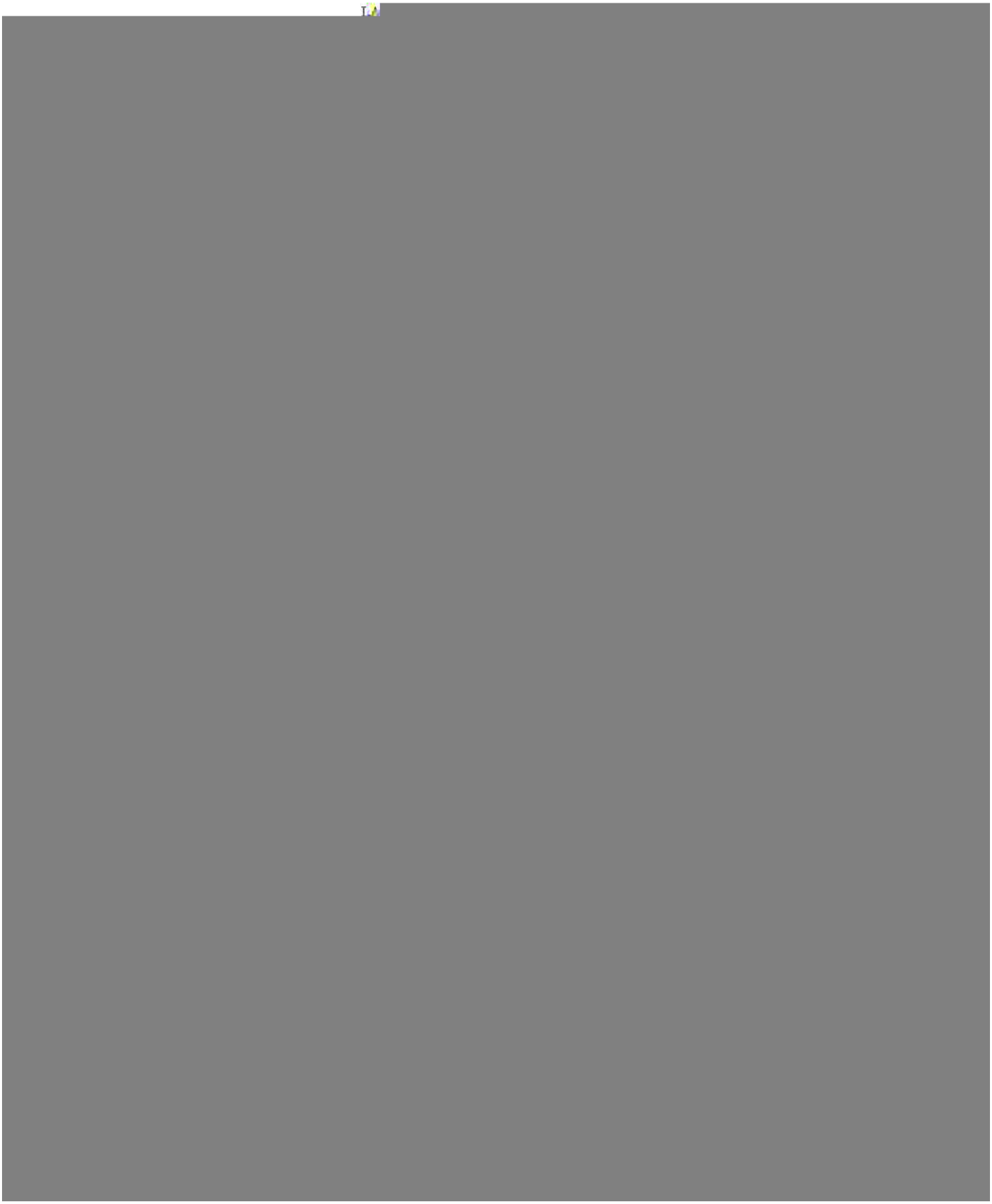
55—Kim loam, 5 to 9 percent slopes. This strongly sloping soil is on uplands and fans. This soil has the

moist; moderate fine granular structure; slightly hard, friable; mildly alkaline; abrupt smooth boundary.

B21t—4 to 11 inches; reddish brown (2.5YR 4/3) heavy loam, dark reddish brown (2.5YR

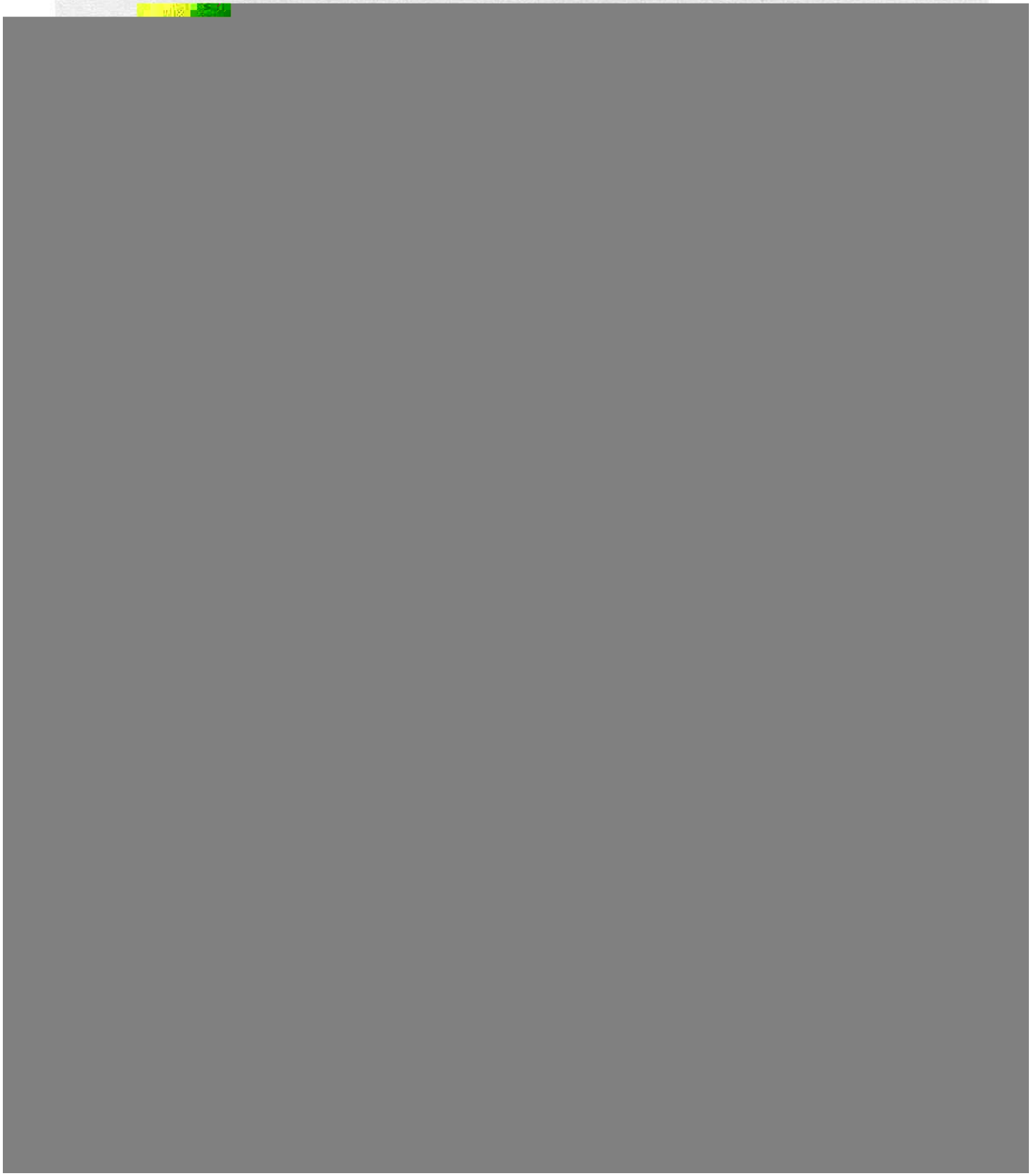
areas of soils that are similar to Kirtley and Purner soils but in which more sandstone fragments are in

Included with this complex in mapping are about 20 percent areas

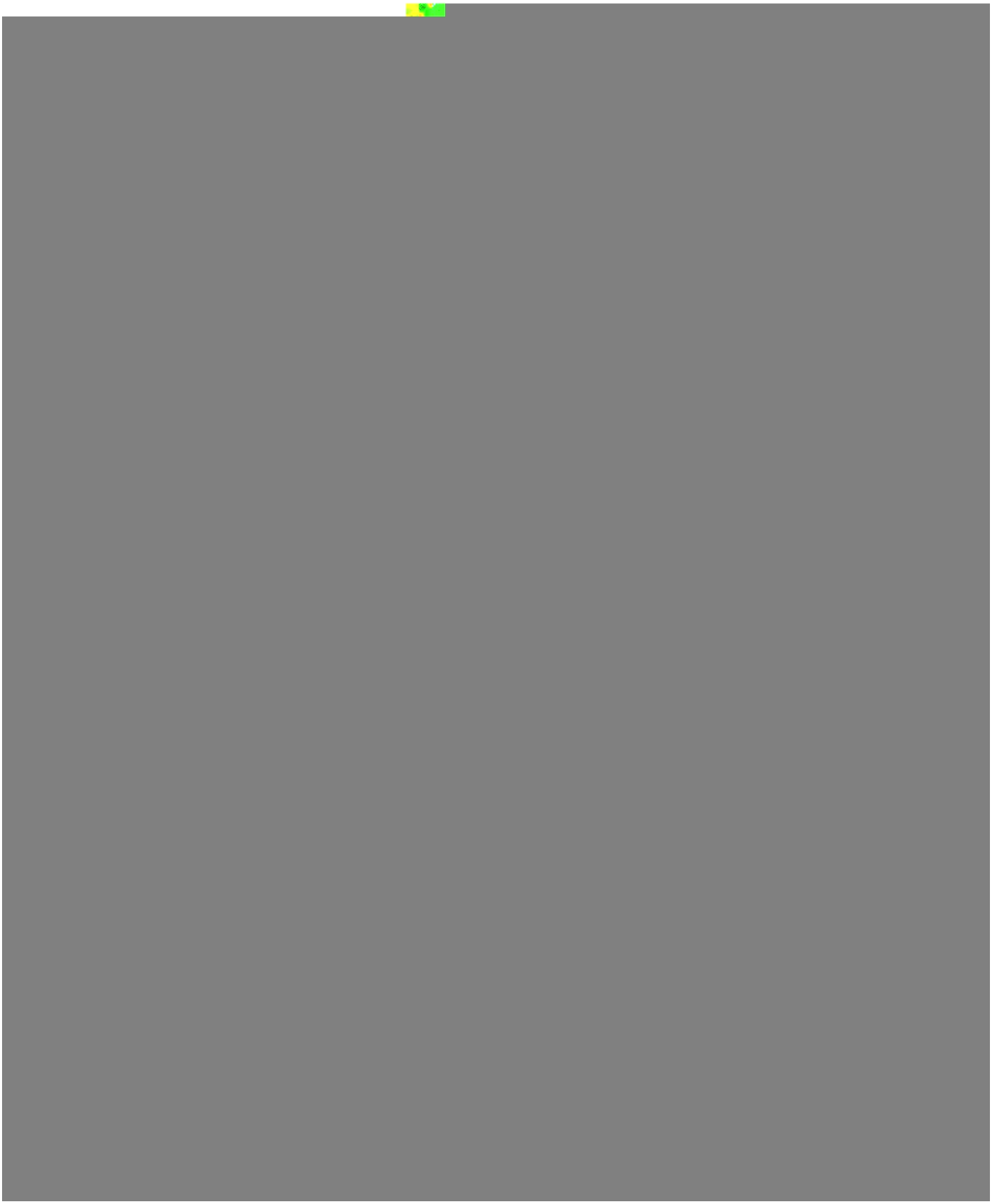


beets. Under dryland management it is well suited to pasture or native grasses and, to a lesser extent, wheat

very hard, very firm; common medium distinct mottles of ye



surface layer is



Naz Series

The Naz series consists of deep, well drained soils that formed in material weathered mainly from granite. These soils are on terraces and valleysides. Elevation ranges from 7,500 to 9,000 feet. Slopes are 1 to 25 percent. The native vegetation is mainly scattered pine and an understory of junegrass, Idaho fescue, sage-

Included with this soil in mapping are a few small areas of soils in which granite bedrock is at a depth of 30 to 60 inches. Also included are a few small areas of soils in which gravel is at a depth of 40 to 60 inches and a few small areas of granite outcrop.

Runoff is medium to rapid, and the hazard of erosion is severe.

This soil is suited to pasture and nativ

sandy loam. Depth to calcareous material is 0 to 4 inches.

71—Nelson fine sandy loam, 3 to 9 percent slopes. This gently sloping to moderately sloping soil is on uplands.

Included with this soil in mapping are small areas of soils that are more sloping or less sloping. Also included are some small areas of Otero and Tassel soils.

Runoff is medium, [redacted]

medium distinct bright colored mottles; slightly acid.

The A horizon is loam, sandy loam, or sandy clay loam 3 to 10 inches thick. The B2g horizon is sandy loam or light sandy clay loam. The A and B horizons range from slightly acid to neutral. Content of rock fragments ranges from 0 to 15 percent in the upper part of the profile and from 35 to 70 percent in the

[redacted]

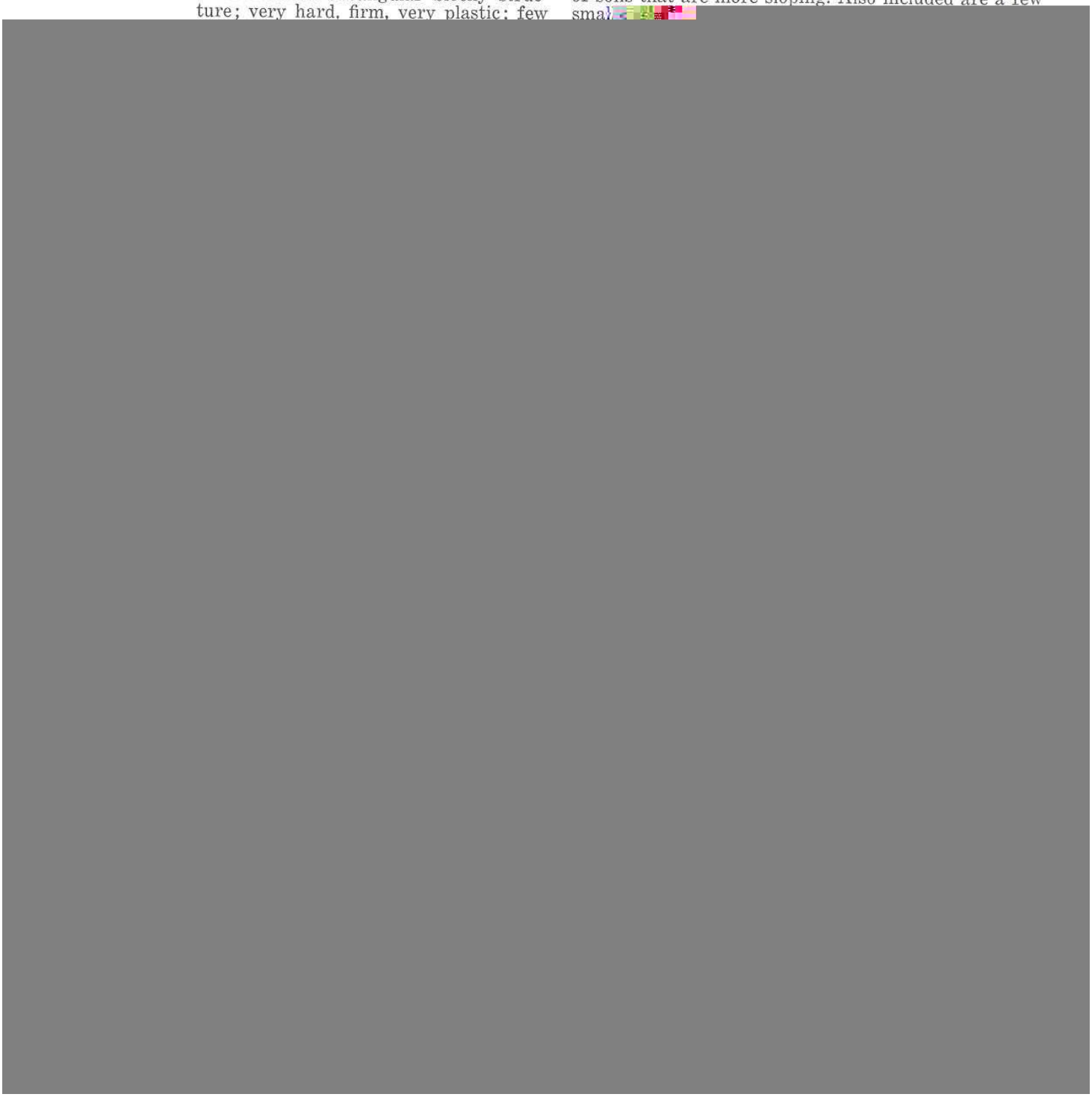
4/3) moist; moderate medium and coarse prismatic structure parting to moderate medium subangular blocky; very hard, firm, very sticky and very plastic; thin nearly continuous clay films on peds; noncalcareous; mildly alkaline; clear smooth boundary.

B3ca—24 to 29 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; very hard, firm, very plastic; few

30 inches. Sand and gravel are below a depth of 40 inches in some profiles. Some profiles have substrata with a redder hue.

73—Nunn clay loam, 0 to 1 percent slopes. This level soil is on high terraces and fans. This soil has a profile similar to the one described as representative of the series, but the combined thickness of the surface layer and subsoil is about 35 inches.

Included with this soil in mapping are small areas of soils that are more sloping. Also included are a few



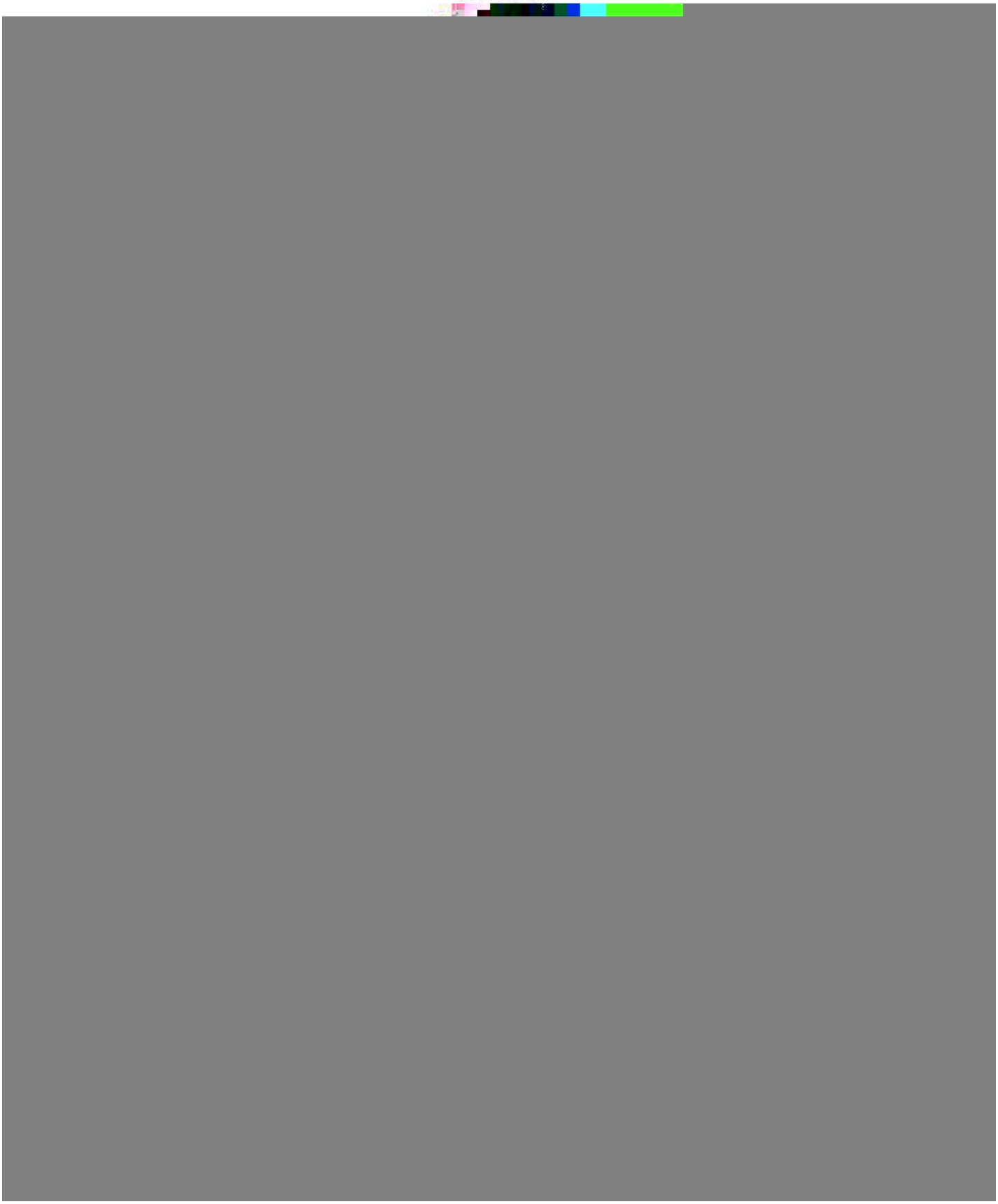
Capability units IIe–1, irrigated, and IIIe–6, dryland; Clayey Foothill range site; windbreak suitability group 1.

75—Nunn clay loam, 3 to 5 percent slopes. This gently sloping soil is on high terraces and fans. This soil has a profile similar to the one described as representative of the series, but the combined thickness of the surface layer and subsoil is about 24 inches.

Included with this soil in mappin[redacted]

Representative profile of Otero sandy loam in an area of Otero-Nelson sandy loams, 3 to 25 percent slopes, in native grass, about 300 feet south and 1,420 feet west of the northeast corner of sec. 11, T. 10 N., R. 68 W.:

A1—0 to 4 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak very fine granular structure; soft,



fine sandy loam, dark reddish brown (2.5YR 3/4) moist; weak fine granular structure; soft, very friable; 10 percent sandstone fragments; calcareous; neutral; clear smooth boundary.

C1—5 to 9 inches; reddish brown (2.5YR 5/4) channery fine sandy loam, reddish brown (2.5YR 4/4) moist; weak fine granular and weak medium subangular blocky structure; slightly hard, very friable; 30 percent sandstone fragments;

These soils are used for recreation, building sites, quarry sites, and limited grazing.

Representative profile of Pinata stony sandy loam in an area of Pinata-Rock outcrop complex, 15 to 45 percent slopes, in forest, about 1,500 feet west of the center of sec. 34, T. 5 N., R. 70 W.:

O1—1 inch to 0; partly decayed pine needles and leaves.

A1—0 to 2 inches; dark brown (7.5YR 4/2) stony sandy loam, very dark brown (7.5YR 2/2) moist; weak p

drained or poorly drained soils that formed in alluvium. These soils are on terraces, flood plains, and drainageways. Elevation ranges from 4,800 to 5,600 feet. Slopes are 0 to 1 percent. The native vegetation is sedges, bluegrass, timothy, and other water-tolerant grasses and forbs. Mean annual precipitation ranges from 13 to 15 inches, mean annual air temperature ranges from 48° to 50° F, and the frost-free season ranges from

to pasture and native grasses. Capability unit IVw–1, irrigated; Wet Meadow range site; windbreak suitability group 5.

Purner Series

The Purner s

Capability unit VIe–3, dryland; Shallow Foothill range site; not assigned to a windbreak suitability group.

86—Purner-Rock outcrop complex, 10 to 50 percent slopes. This complex consists of moderately steep or steep soils on uplands and ridges. It is about 55 percent Purner fine sandy loam and about 30 percent Rock outcrop. Purner fine sandy loam is smoother and

horizon can be penetrated with a spade with difficulty; very high mica content.

The A horizon is loam or sandy loam 7 to 20 inches thick. The B2 horizon is absent in some profiles. Content of rock fragments, mainly phyllite, schist, or granite ¼ inch to 2 inches in size, ranges from 35 to 8

brown (10YR 4/2) moist; weak fine depth of 12 inches and moderately alkaline bel

to a lesser extent, wheat, barley, beans, and corn. Under dryland management it is suited to pasture and native grasses and, to a lesser extent, wheat and barley.

not assigned to a range site or windbreak suitability group.

C2ca—44 to 60 inches; very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable; violently effervescent; visible secondary calcium carbonate as seams and streaks; moderately alkaline.

The A horizon is loam or light clay loam 4 to 11 inches thick. The B horizon is loam or light clay loam. Thickness of the mollic epipedon ranges from 7 to 18 inches. Reaction ranges from neutral to moderately alkaline. Depth to calcareous material ranges from 15 to 20 inches.

94—Satanta loam, 0 to 1 percent slopes. This level soil is on terraces and uplands. This soil has a profile similar to the one described as representative of the series, but the combined thickness of the surface layer and subsoil is about 24 inches.

Included with this soil in mapping are a few areas of soils that have gravel on the surface. Also included are a few small areas of Carnero and Kim soils, many gullies as much as 15 feet wide and 10 to 12 feet deep, and many smaller gullies between.

Runoff is medium to rapid, and the hazard of erosion is severe.

This soil is best suited to pasture and native grasses. If runoff from adjacent areas can be diverted, wheat and barley can be grown. Capability unit IVe–4, dryland; Loamy Foothill range site; not assigned to a windbreak suitability group.

Satanta Variant

clay loam, grayish brown (10YR 5/2) moist; weak medium platy and moderate fine subangular blocky structure; hard, friable; calcareous; moderately alkaline; calcium sulfate as many crystals and nodules; clear smooth boundary.

C1cacs—26 to 35 inches; white (10YR 8/2) loam, light gray (10YR 7/2) moist; massive; slightly hard, friable; many calcium sulfate crystals and nodules; visible secondary calcium carbonate as spots and seams; calcareous; moderately alkaline; clear smooth [redacted]

Permeability is moderate, and the available water capacity is low. Reaction is medium acid above a depth of 12 inches and slightly acid below that depth.

These soils are used mainly for forest and recreation.

Representative profile of Schofield coarse sandy loam in an area of Schofield-Redfeather-Rock outcrop complex, 5 to 25 percent slopes, in forest, about 3,500 feet north and 1,500 feet east of the southwest corner of sec. 20, T. 9 N., R. 73 W.:

O1—1½ inches to ½ inch; undecomposed organic matter consisting of needles, twigs, and leaves.

[redacted]

not assigned to a range site or windbreak suitability group.

Stoneham Series

the A and B horizons is 10 to 15 inches. Reaction ranges from neutral to moderately alkaline. Depth to calcareous material ranges from 3 to 10 inches, but some profiles are slightl

spots and small areas of soils that are redder and have a surface layer of sandy loam. Also included are small areas of Fort Collins, Kim, and Larimer soils.

Runoff is rapid, and the hazard of erosion is severe.

If irrigated, this soil is well suited to pasture and, to a lesser extent, wheat, barley, and alfalfa. Under dryland management it is suited to pasture or native grasses. Capability units IVe–1, irrigated, and VIe–1, dryland; Loamy Plains range site; windbreak suitability group 1.

Sunshine Series

The Sunshine series consists of moderately deep, well drained soils that formed in material weathered from sandstone. These soils are on mountainsides and ridges and are underlain by sandstone at a depth of 20 to 40 inches. Elevation ranges from 8,500 to 9,500 feet. Slopes are 5 to 15 percent. The native vegetation is mainly Arizona fescue, bluebunch wheatgrass, mountain muhly, and big sage. Mean annual precipitation ranges from 15 to 17 inches, mean annual air temperature ranges from 40° to 44° F, and the average frost-free season ranges from 60 to 85 days.

In a representative profile the surface layer is grayish brown stony sandy loam about 10 inches thick. The subsurface layer is light gray stony sandy loam about 5 inches thick and brown very stony clay loam that is mixed with light gray fine sandy loam and is about 4 inches thick. The subsoil is brown very stony clay about 9 inches thick. The underlying material is

B2t—19 to 28 inches; brown (7.5YR 5/4) very stony clay, dark brown (7.5YR 4/4) moist; strong medium subangular blocky structure; hard, firm; thin nearly continuous clay films on ped faces; 40 percent stones; neutral.

Cr—28 to 40 inches; fragmental sandstone.

The A1 horizon is sandy loam to loam 6 to 12 inches thick. The A2 horizon is sandy loam to light loam 3 to 6 inches thick. The B2t horizon is clay or heavy clay loam. Reaction ranges from slightly acid to neutral. Content of rock fragments, mainly flagstones and stones, ranges from 35 to 80 percent.

104—Sunshine stony sandy loam, 5 to 15 percent slopes. This strongly sloping to moderately steep soil is on ridges and mountainsides.

Included with this soil in mapping are a few small areas of soils that are more sloping or less sloping. Also included are a few small areas of Pendergrass and Naz soils.

Runoff is medium, and the hazard of water erosion is severe.

This soil is suited to pasture and native grasses. Capability unit VIe–6, dryland; Subalpine Loam range site; not assigned to a windbreak suitability group.

Table Mountain Series

The Table Mountain series consists of deep, well drained soils that formed in alluvium. These soils are

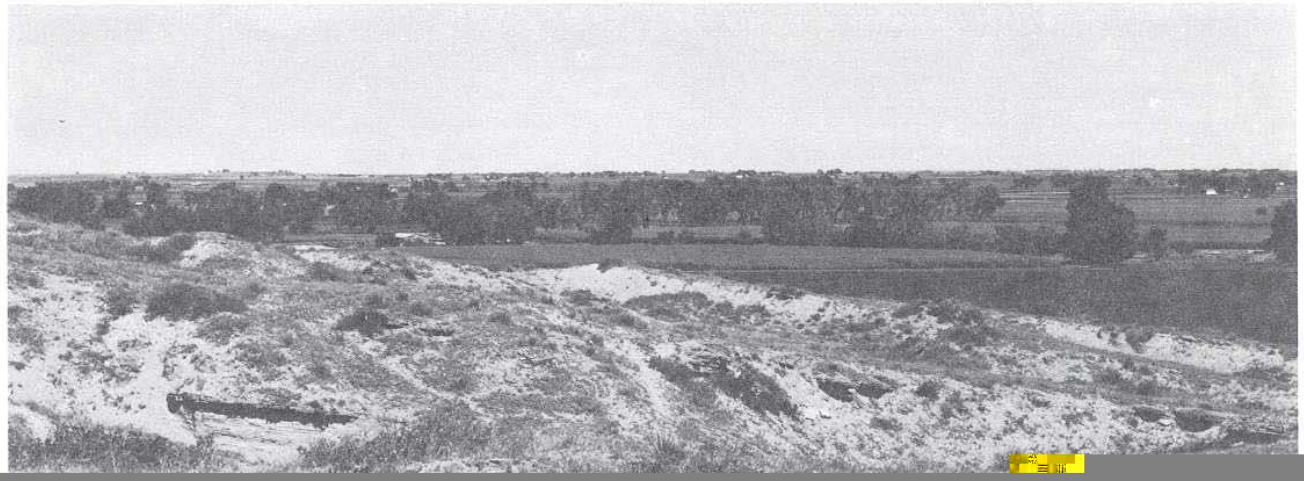
friable; calcareous; few spots and seams of secondary calcium carbonate; moderately alkaline; gradual smooth boundary.

C2ca—46 to 51 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; very hard, friable; calcareous; few spots and seams of secondary calcium carbonate; few medium distinct mottles; moderately alkaline; gradual wavy boundary.

moist; weak coarse subangular blocky structure; slightly hard, very friable; calcareous; moderately alkaline; gradual wavy boundary.

C2r—12 to 60 inches; gray calcareous soft sandstone.

The A1 horizon is sandy loam or fine sandy loam 2 to 5 inches thick. The C horizon is sandy loam or fine sandy loam 8 to 14 inches thick. Depth to calcareous material ranges from 0 to 4 inches. Reaction ranges from mildly alkali[illegible]



ranges from 7,500 to 8,500 feet. Slopes are 5 to 25 percent. The native vegetation is mainly Idaho fescue, needleandthread, and sage. Mean annual precipitation ranges from 15 to 18 inches, mean ann[redacted]

grained; extremely hard, very friable; 60 percent fine and very fine granite gravel; strong continuous horizon of

A11—0 to 8 inches; brown (10YR 4/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; 25 percent gravel; slightly acid; clear smooth boundary.

A12—8 to 15 inches; brown (10YR 4/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky and weak fine granular structure; slightly hard, very friable; 25 percent gravel; slightly acid; clear smooth boundary.

C1—15 to 18 inches; yellowish brown (10YR 5/4) very gravelly loamy sand, brown (10YR 4/3) moi

nual precipitation ranges from 15 to 18 inches, mean annual air temperature ranges from 44° to 46° F, and the frost-free season ranges from 75 to 100 days.

In a representative profile (fig. 12) the surface layer is dark grayish brown sandy loam about 9 inches thick. The subsoil is brown clay loam about 26 inches thick. The underlying material is brown sandy clay loam.

Permeability is moderate, and the available water capacity is high. Reaction is slightly acid above a depth of about 9 inches and neutral below that depth.

These soils are used mainly for native grasses and recreation.

Representative profile of Trag sandy loam in an area of Trag-Moen complex, 5 to 30 percent slopes, in

weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm; thin patchy clay films; neutral; clear wavy boundary.

B2t—16 to 35 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm; thin nearly continuous clay films; neutral; clear smooth boundary.

clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine subangular blocky structure parting to moderate fine granular; slightly hard, friable; mildly alkaline; clear smooth boundary.

B2t—4 to 14 inches; light brownish gray (2.5Y 6/2) heavy clay loam, grayish brown (2.5Y 5/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm; thin p

Also included are small areas of Heldt and Renohill soils.

Runoff is medium, and the hazard of erosion is moderate.

If irrigated, this soil is suited to wheat, barley, and alfalfa and, to a lesser extent, corn, sugar beets, and beans. Under dryland management it is suited to wheat and barley. It is also well suited to pasture and native grasses. Capability units IIIe–1, irrigated, and IVe–3, dryland; Clayey Plains range site; windbreak suitability group 1.

Weld Series

The Weld series consists of deep, well drained soils that formed in uniform textured, silty, wind-deposited material. These soils are on uplands. Elevation ranges from 4,800 to 5,600 feet. Slopes are 0 to 3 percent. The native vegetation is mainly blue grama, western wheatgrass, sage, and cactus. Mean annual precipitation ranges from 13 to 15 inches, mean annual air temperature ranges from 48° to 50° F, and the frost-free season ranges from 135 to 150 days.

In a representative profile the surface layer is grayish brown silt loam about 7 inches thick. The upper part of the subsoil is dark brown light silty clay about 8 inches thick, and the lower part is brown and pale

B3ca—20 to 30 inches; pale brown (10YR 6/3) light silty clay loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable; thin patchy clay films on peds; calcareous; visible secondary calcium carbonate as spots and finely divided forms; moderately alkaline; clear smooth boundary.

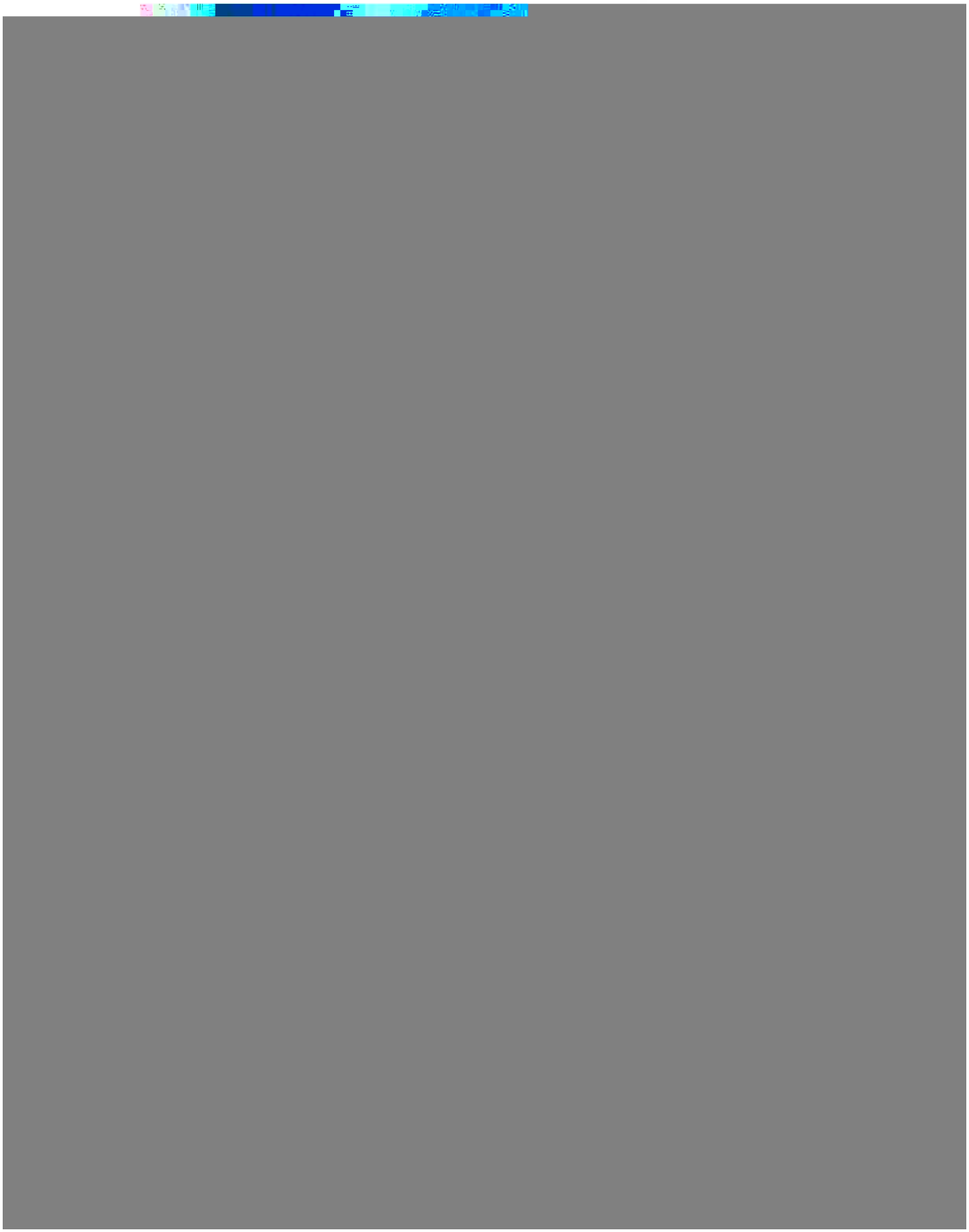
Cca—30 to 60 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; massive; soft, very friable; calcareous; visible secondary calcium carbonate as spots and finely divided forms; moderately alkaline.

The A horizon is loam or silt loam 5 to 12 inches thick. The B2t horizon is heavy silty clay loam or silty clay. The combined thickness of the A and B horizons ranges from 15 to 35 inches. Reaction ranges from neutral to moderately alkaline.

115—Weld silt loam, 0 to 3 percent slopes. This nearly level soil is on uplands.

Included with this soil in mapping are a few small areas of soils that are slightly more sloping and a few small areas of soils that have a surface layer of silty clay loam. Also included are small areas of Wiley soils.

Runoff is slow. The hazard of erosion is slight, but



that are more sloping or less sloping and a few small kler irrigation, and

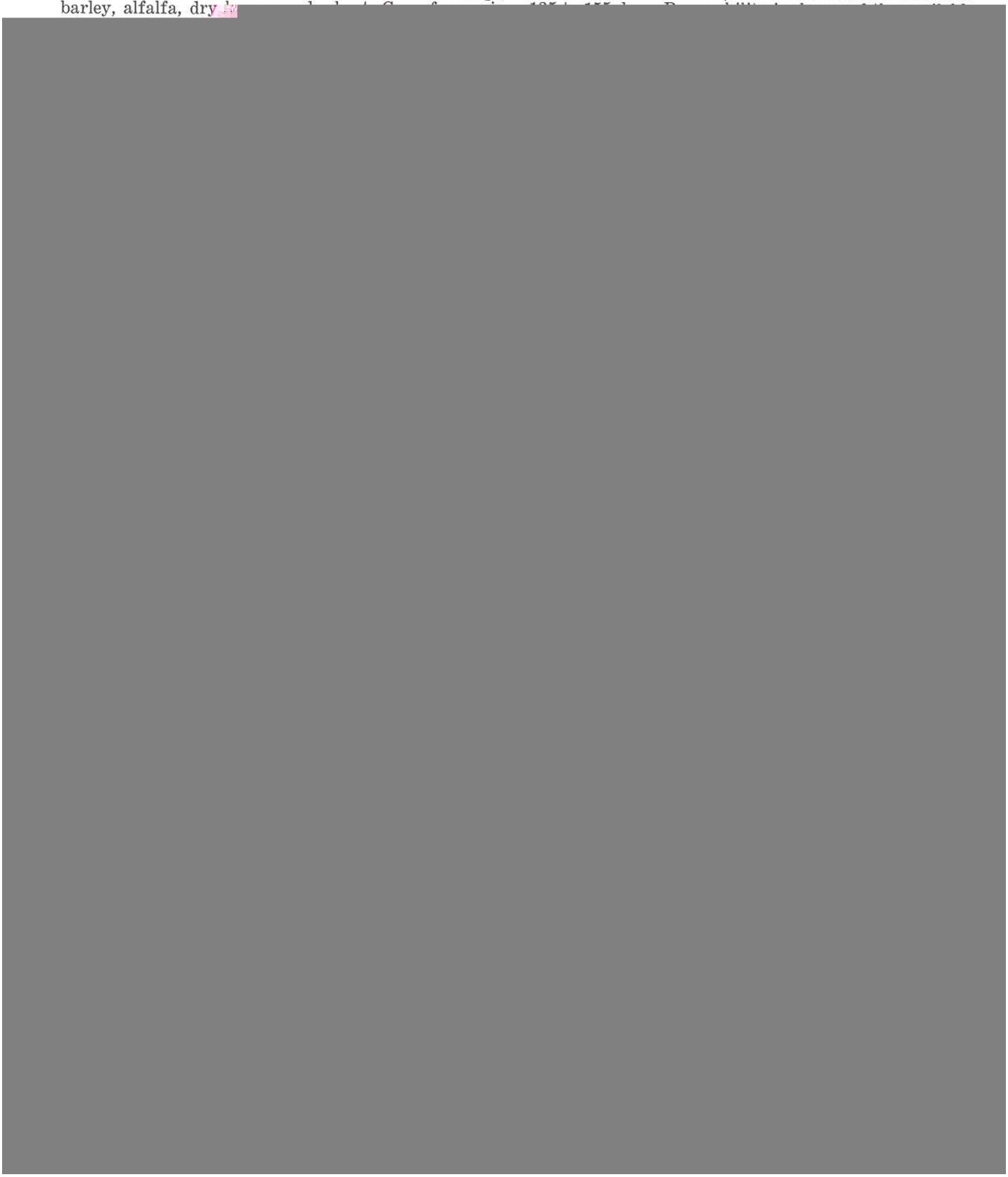
of irrigation water. On some soils chemical amendments are helpful. Salt-tolerant crops, such as barley or sugar beets, can be grown until

from blowing, emergency tillage is necessary at times. Implements are used that bring clods to the surface,

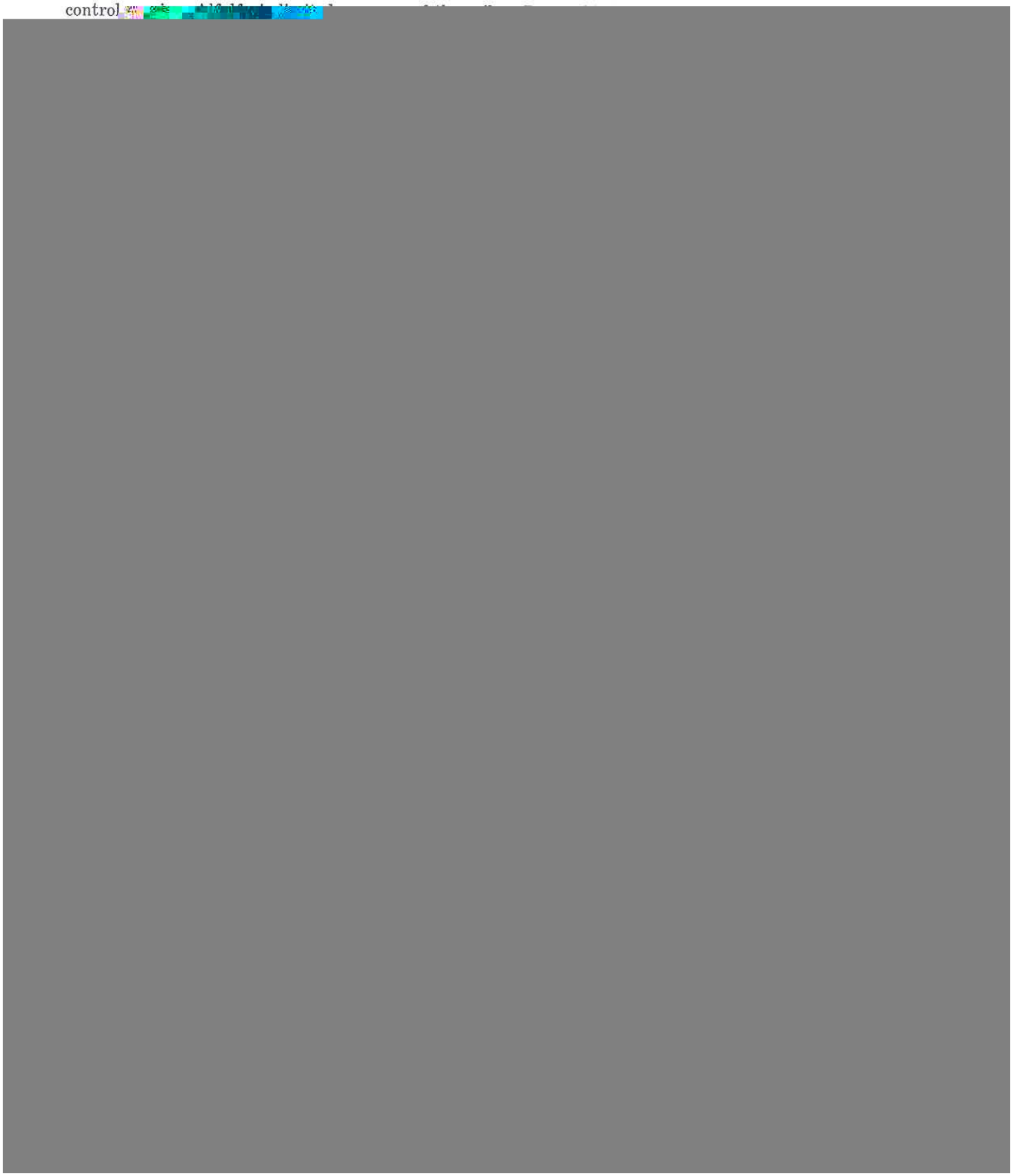
erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with

moderate to moderately slow, but it is slow on some soils. The available water capacity is high. Th

grown in the Area. The main crops are corn for silage, barley, alfalfa, dry [illegible] tion is 13 to 15 inches, and the frost-free season is



control [redacted]



such as corn and beans, can be grown occasionally, but care is needed to prevent erosion. Alfalfa is limited by depth on some of the soils.

Limiting row crops and keeping the soil in pasture, alfalfa, or small grain help to control erosion. Use of crop residue helps to maintain organic-matter content and control erosion. If row crops are grown, they should be limited to one year and planted across the slope.

Sprinkler systems, controlled flooding from contour ditches, contour furrows, and cross-slope furrows are suitable irrigation methods. Short irrigation runs help to control erosion, aid in uniform irrigation, and avoid waterlogging soils that are underlain by sandstone.

CAPABILITY UNIT IVw–1, IRRIGATED

This unit consists of shallow to deep, poorly drained soils that have a surface layer of sandy loam to loam

to rapid, and the available water capacity is low to high. The hazard of erosion is slight. Runoff is slow.

These soils are suited to hay and pasture.

Good water management practices help to avoid waterlogging the soils and control erosion. The length of runs should be fairly short to conserve water on the rapidly permeable soils. Nitrogen fertilizer improves production and quality of hay.

Dryland capability units

In this section each dryland capability unit in the survey area is described, and use and management of the soils are discussed.

CAPABILITY UNIT IIIe–6, DRYLAND

This unit consists of deep, well drained soils that generally have a surface layer of loam, silt loam, or clay loam; a subsoil of clay loa

moderately rapid, and the available water capacity is high. The hazard of erosion is slight to moderate. Runoff is slow to medium.

These soils are suited to most of the commonly grown crops. Wheat and barley are the main crops. The soils are also suited to pasture and native grasses.

A small grain-fallow system is a common practice for moisture conservation, but wind erosion is a hazard when the soils are fallow. Stubble mulching or use of crop residue and stripcropping help to control erosion. The soils respond well to nitrogen in years of sufficient rainfall.

loam. The annual precipitation is 13 to 15 inches, and the frost-free season is 135 to 150 days. Permeability is moderate, and the available water capacity is high. The hazard of erosion, mainly water erosion, is severe. Runoff is medium to rapid. This soil receives runoff from adjacent areas.

This soil is suited to small grain, pasture, or native grasses. Wheat-summer fallow is a common cropping system.

This soil should be protected from runoff from adjacent areas by diversions or terraces. Grassed waterways help to carry off excess water and help to control erosion. Stubble mulching or use of crop residue

to 100 days. Permeability is rapid, and the available water capacity is medium. The hazard of erosion is slight to moderate. Runoff is slow.

This soil is used for pasture and native grasses. Barley, wheat, or other short season crops can be

available water capacity is low to medium. The hazard of erosion is moderate to severe. Runoff is medium.

These soils are suited to pasture and native grasses.

Maintaining good vegetative cover is important for

CAPABILITY UNIT VIe–6, DRYLAND

This unit consists of deep and moderately deep, well drained soils that have a surface layer of loamy fine sand to fine sandy loam and a subsoil or subsurface layer of loamy fine sand to clay. The underlying material is gravelly [redacted] layer of clay to loamy sand. The underlying material is clay loam to loam in the deep soils and sandstone, granite, or schist in the moderately deep and shallow soils. Some of the soils are gravelly, channery, or stony. Slopes are 1 to 60 percent. The annual pre-

TABLE 2.—*Yields per acre*

[All yields were estimated for a high level of management in 1975. Absence of a yield indicates the crop is seldom grown or is not suited. Absence of a soil unit indicates the soil is seldom cropped. Asterisk indicates mapping unit consists of two or more dominant kinds of soil. See mapping unit description for composition and behavior of t

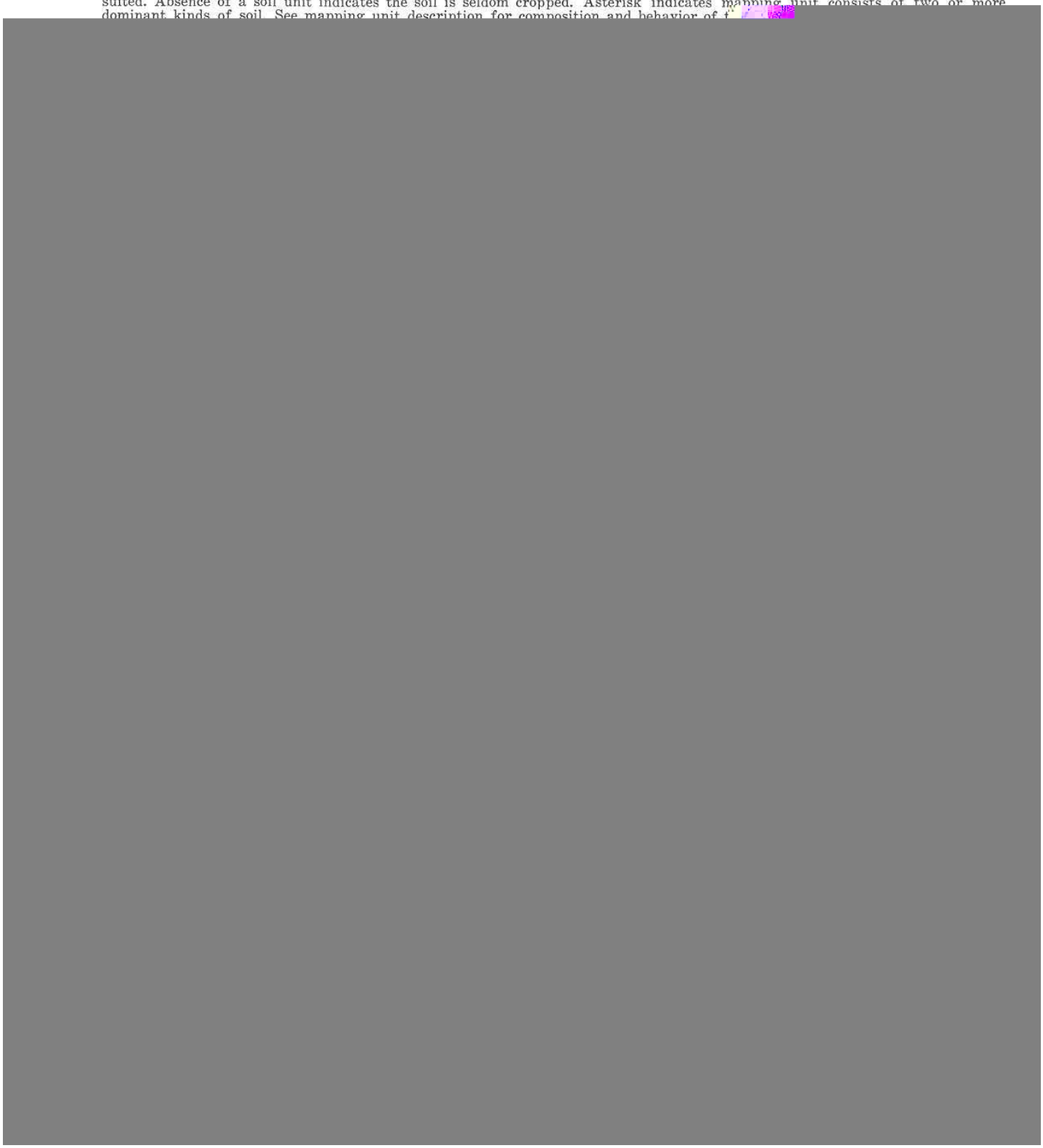


TABLE 2.—*Yields per acre*—Continued

Soil name and map symbol	Irrigated crops						Dryfarmed crops	
	Alfalfa for hay	Corn		Sugar beets	Barley	Wheat	Barley	Wheat
		Grain	Silage					
	Tons	*Bu*	*Tons*	*Tons*	*Bu*	*Bu*	*Bu*	*Bu*
Garrett—Continued:								
41	5.0	130	23	22	80	50	25	22
Harlan:								
46	5.[illegible]							

TABLE 2.—*Yields per acre*—Continued

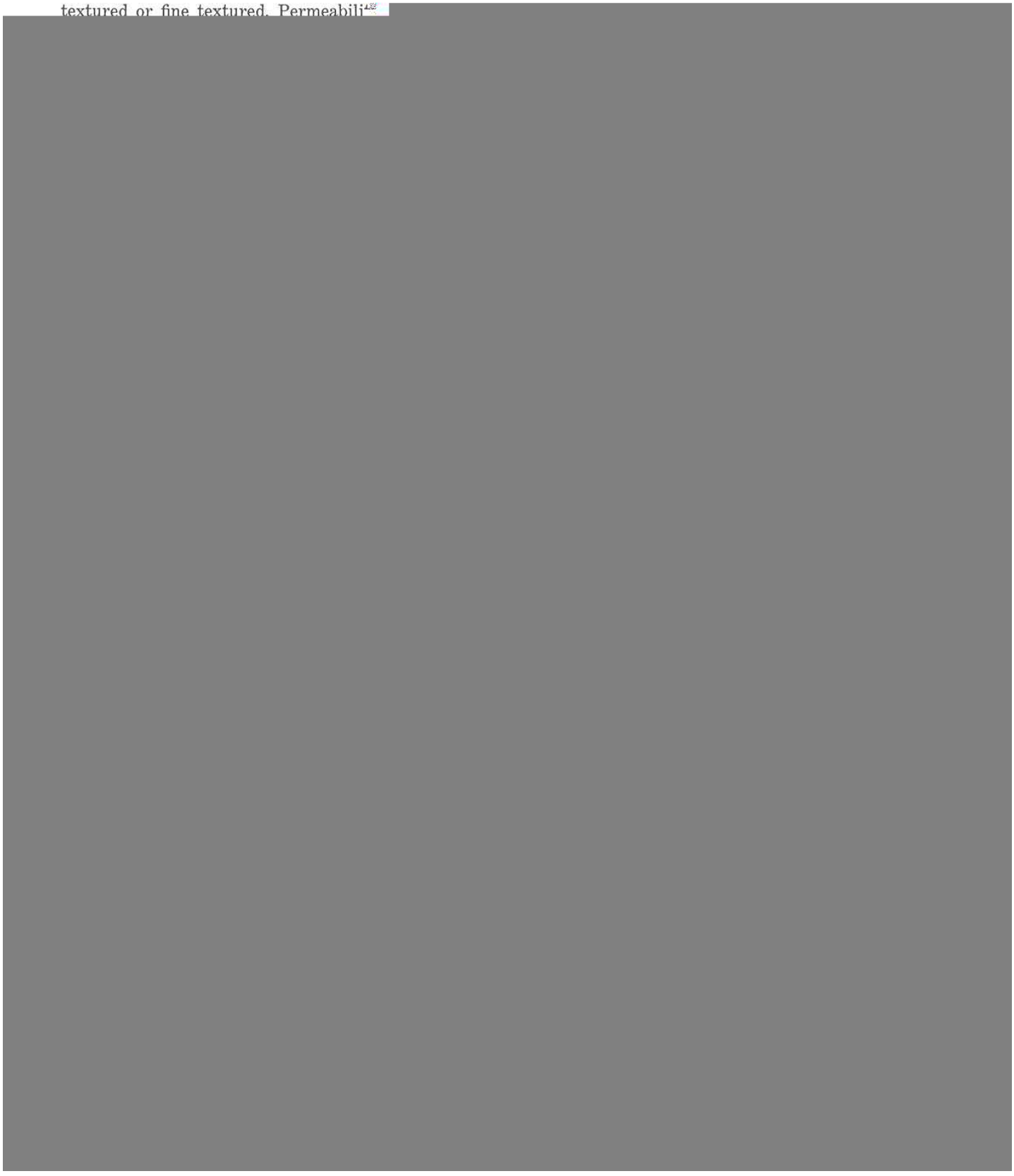
Soil name and map symbol	Irrigated crops					Dryfarmed crops	
	Alfalfa for hay	Corn	Sugar beets	Barley	Wheat	Barley	Wheat

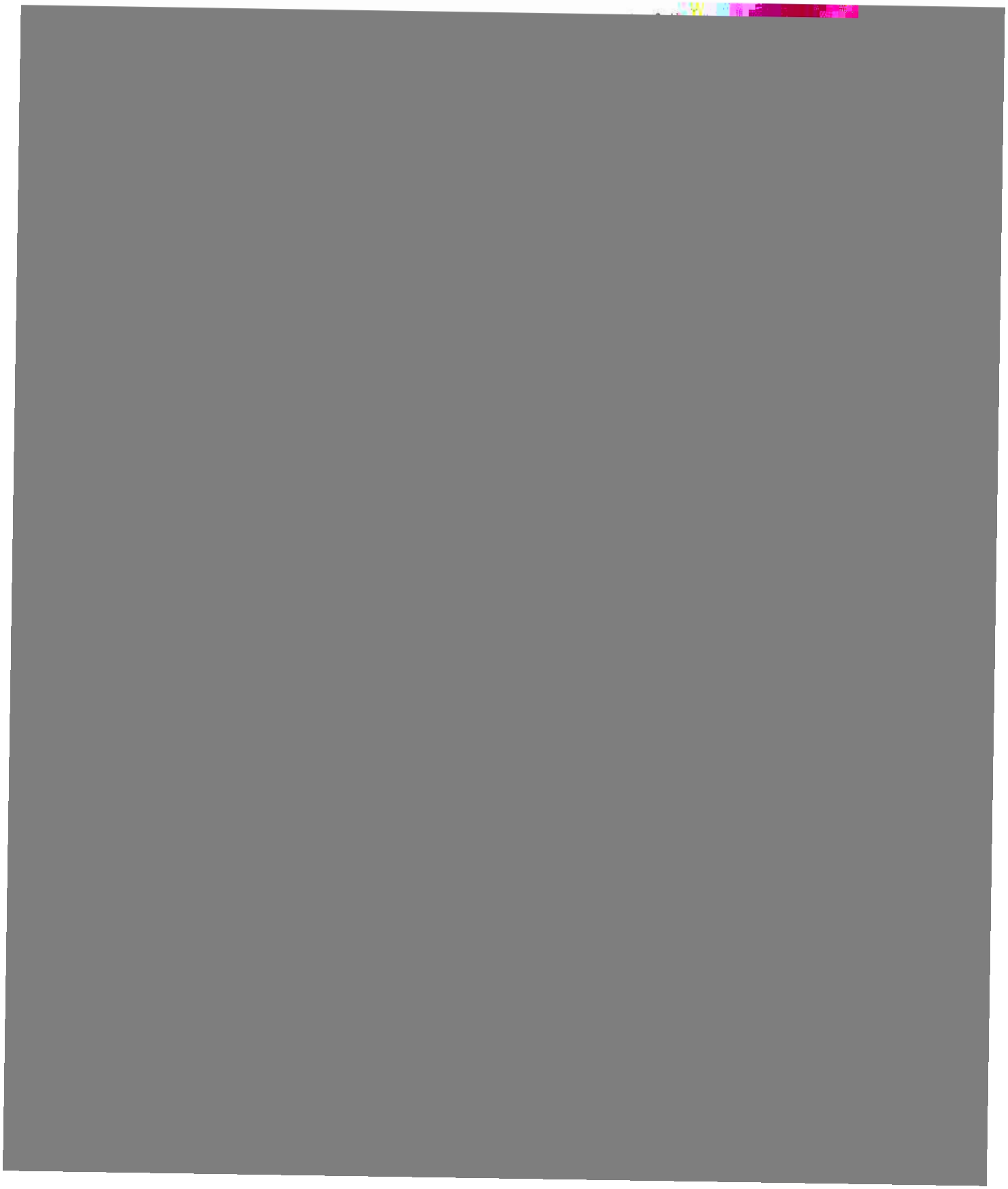
59 percent, or 513,000 acres, of the privately owned [redacted] the climax community but that show up in the [redacted]

SANDY PLAINS RANGE SITE

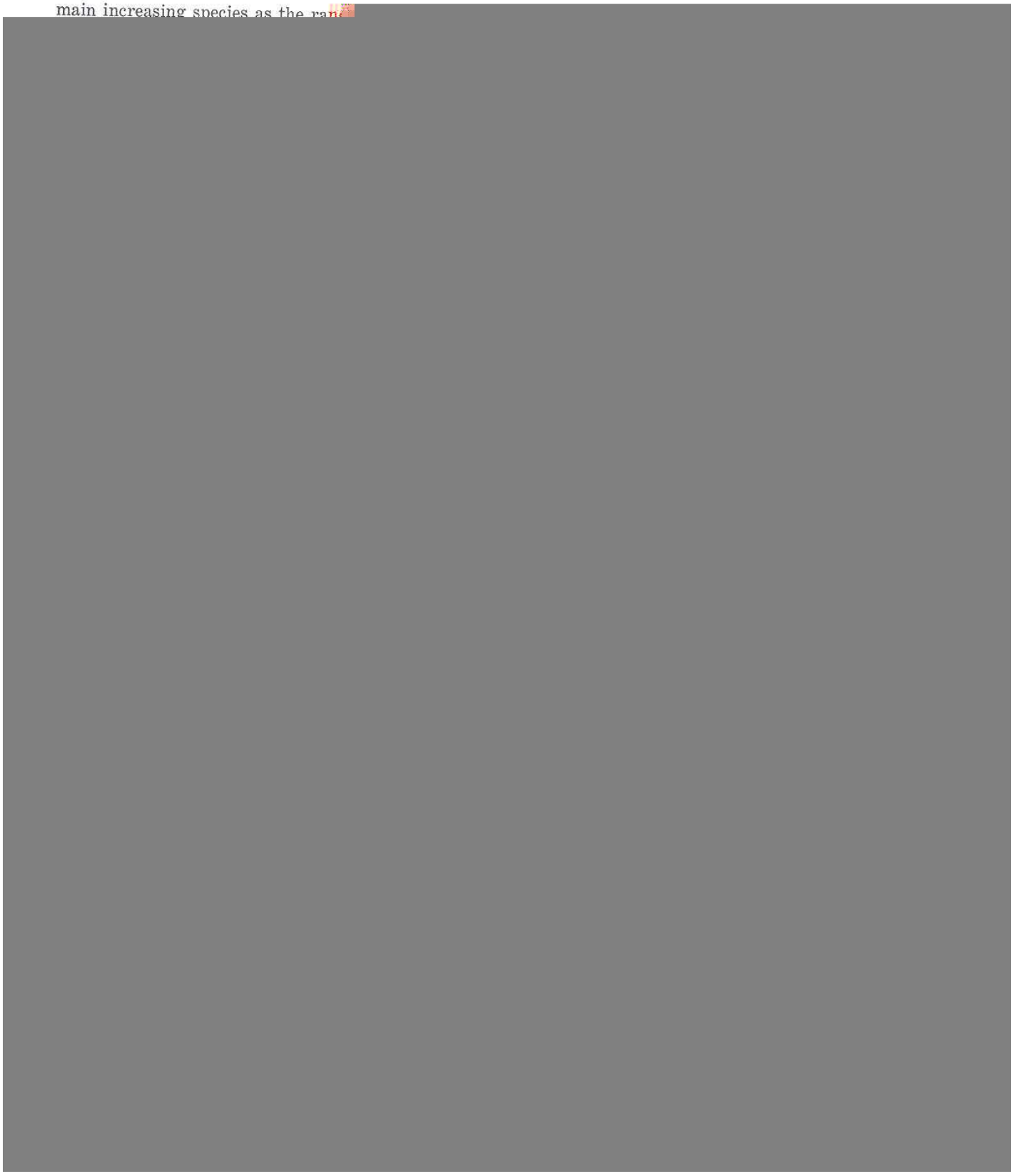
This site consists mainly of nearly level to strongly sloping soils. Elevation ranges from 3,800 to 5,000 feet. [redacted] feet. The soils are deep and well drained. The surface layer is medium textured or moderately fine textured. Permea[redacted]

textured or fine textured. Permeabili[illegible]





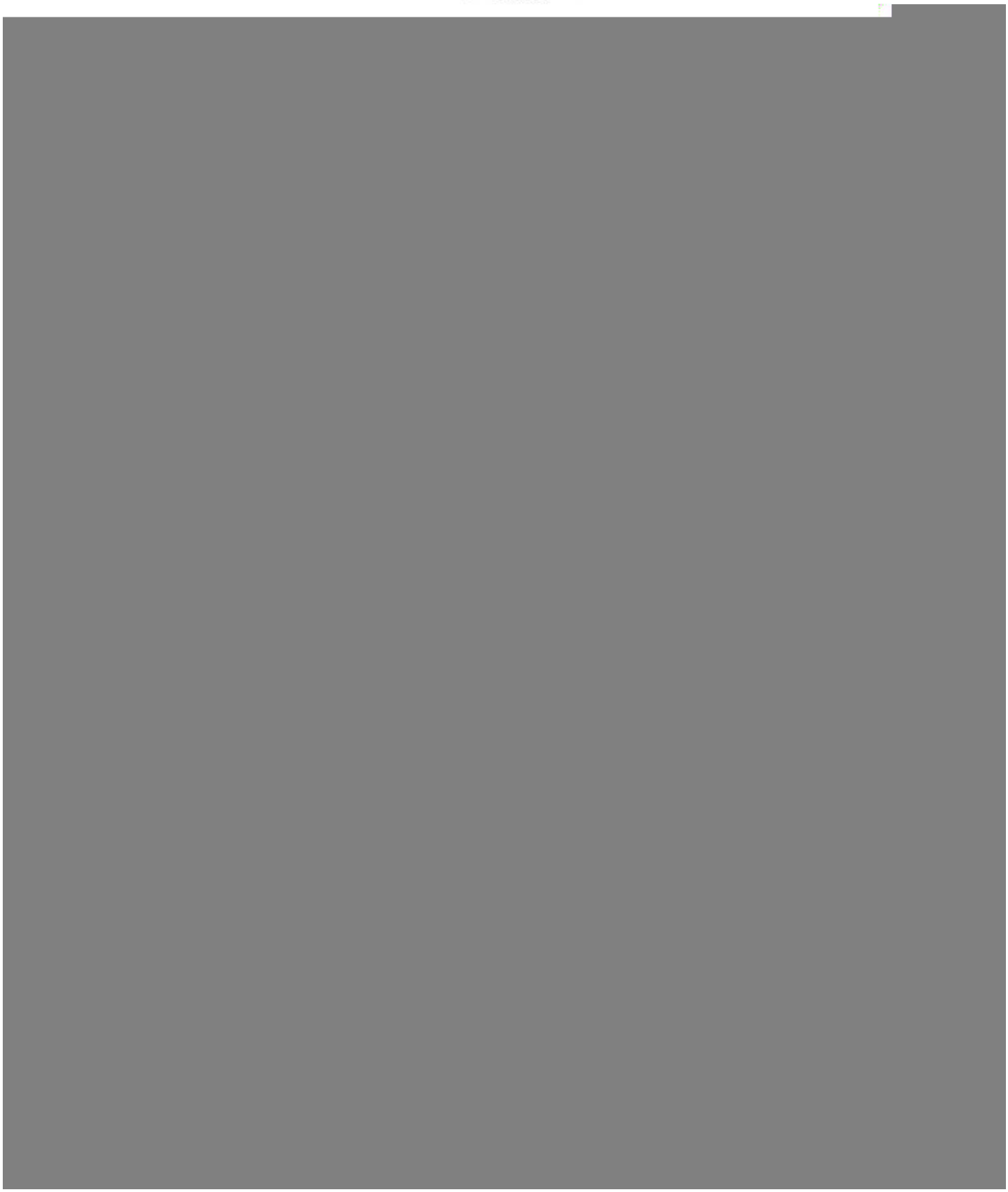
main increasing species as the ra[illegible]



STONY LOAM RANGE SITE

This site consists of moderately steep and steep, stony soils on mountain

tured. Permeability is slow, and the available water capacity is low or medium.



plied during the first year to help the plants develop a good root system.

Assistance in planning windbreaks is available through the local office of the Soil Conservation Service or the Colorado State Forest Service.

alkalinity, shallowness, and low available water capacity.

WINDBREAK SUITABILITY GROUP 5

This group consists of deep and moderately deep, poorly drained soils on bottom l[redacted]

TABLE 3.—*Suitability of windbreak suitability*

	Ponderosa pine	Rocky Mountain juniper

groups for tree and shrub plantings

Siberian elm	Russian-olive	Common lilac	Squawbush (Quailbush)

TABLE 4.—*Wildlife*

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated. Asterisk behavior of the whole

Soil name and map symbol	Potential for habitat elements [1]—			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants
Altvan:				
1, 2	Fair	Good	Good	

habitat potentials

indicates mapping unit consists of two or more dominant kinds of soil. See mapping unit description for composition and mapping unit]

Potential for habitat elements [1]—Continued			Potential as wildlife habitat for—			
Shrubs	Wetland plants	Shallow water areas	Open-land	Woodland	Wetland	Rangeland
Good	Poor	Very poor	Good		Very poor	Good.
Good	Poor	Very poor	Good		Very poor	Good.
Poor	Very poor	Very poor				

TABLE 4.—*Wildlife habitat*

Soil name and map symbol	Potential for habitat elements [1]—			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants
Elbeth:				
*30:				
Elbeth part	Poor	Fair	Good	Good
Moen part	Poor	Poor	Good	
Farnuf:				
31	Fair	Good	Good	
*32:				
Farnuf part	Fair	Good	Good	
Boyle part	Very poor	Very poor	Poor	
Rock outcrop part.				
Fluvaquents:				
33	Very poor	Poor	Fair	
Fort Collins:				
34, 35, 36, 37	Fair	Fair	Fair	
Foxcreek:				
38	Very poor	Poor	Fair	
Gapo:				
39	Very poor	Poor	Good	
Garrett:				
40, 41	Fair	Good	Good	
Gravel pits:				
42.				
Haploborolls:				
*43:				
Haploborolls part	Very poor	Very poor	Very poor	
Rock outcrop part.				
Haplustolls:				
44	Very poor	Very poor	Very poor	
*45:				
Haplustolls part	Very poor	Very poor	Very poor	
Rock outcrop part.				

potentials—Continued

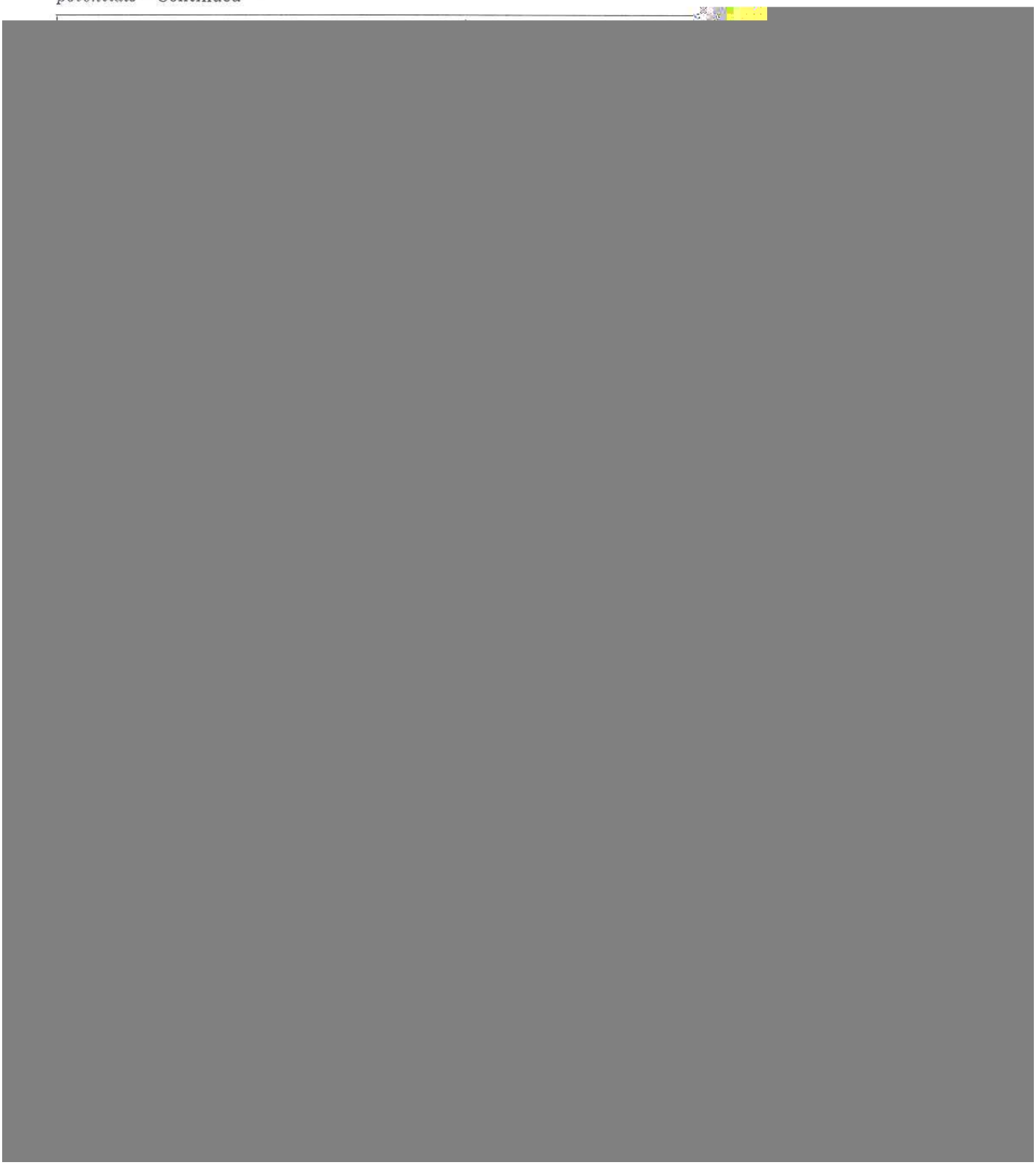
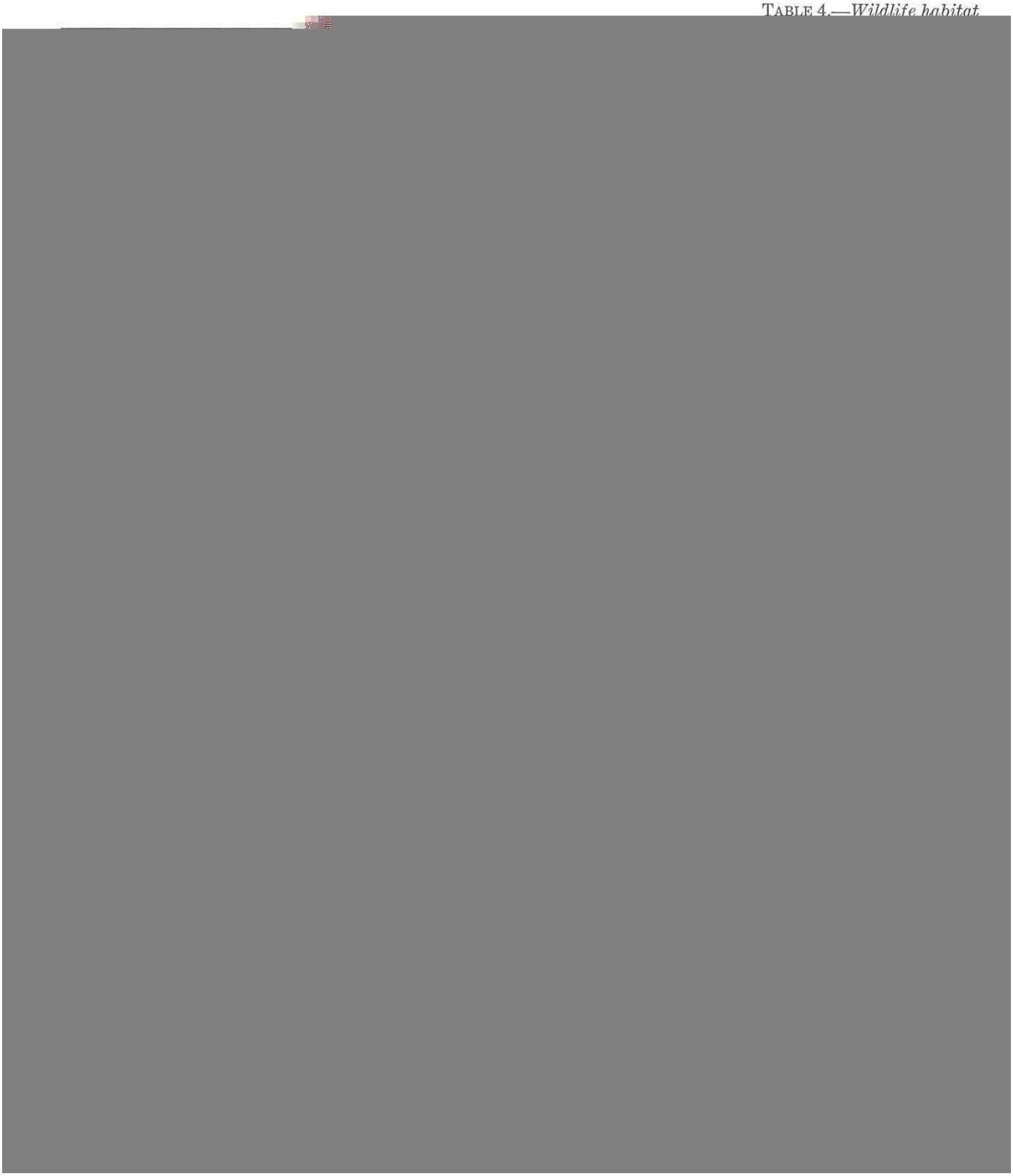


TABLE 4.—*Wildlife habitat*



potentials—Continued

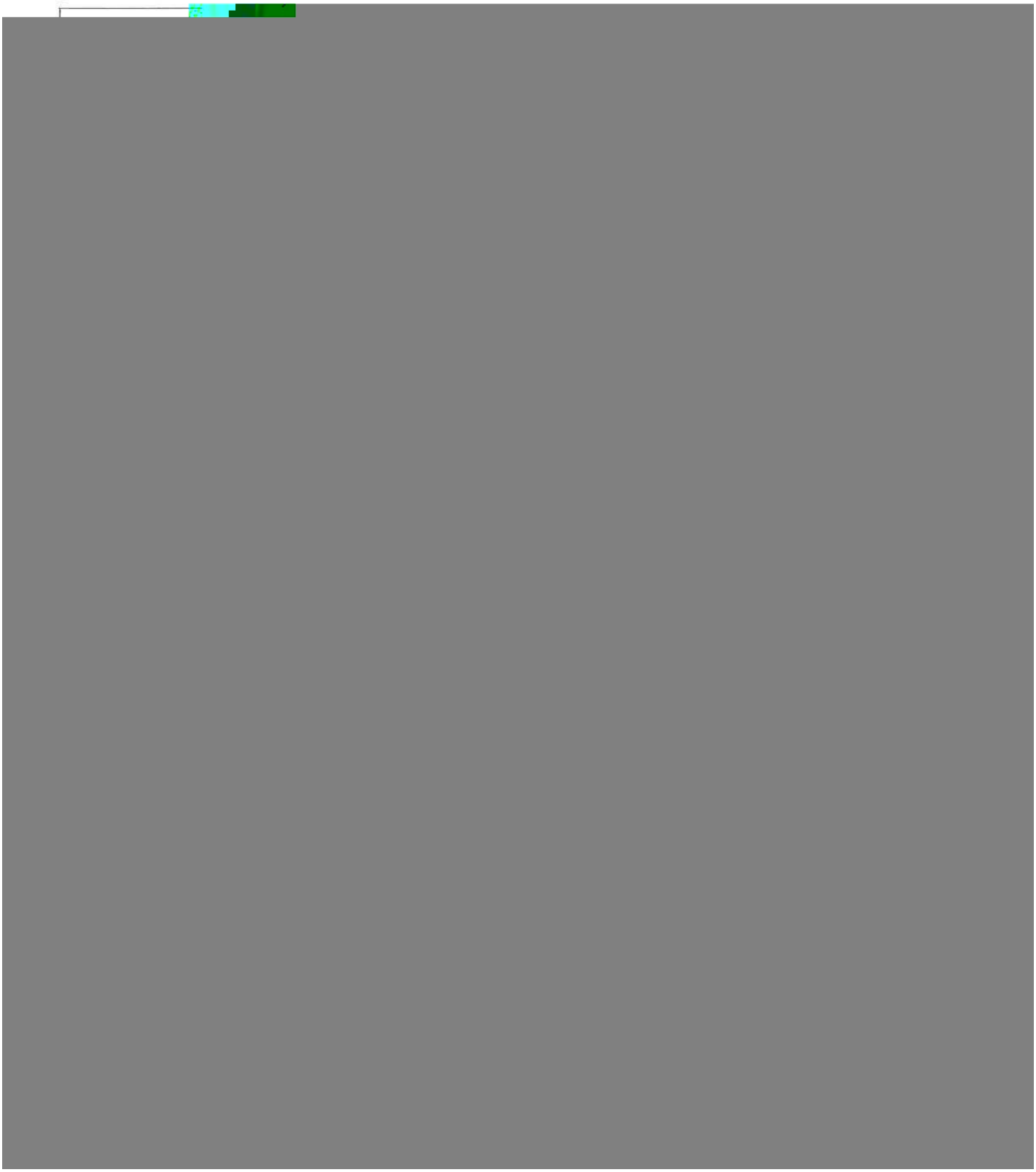


TABLE 4.—*Wildlife habitat*

Soil name and map symbol	Potential for habitat elements [1]—			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants
Pinata:				
*83:				
Pinata part	Very poor	Very poor	Fair	Fair
Rock outcrop part.				
Poudre:				
84	Poor	Fair	Good	
Purner:				
85	Very poor	Poor	Fair	
*86:				
Purner part	Very poor	Poor	Fair	
Rock outcrop part.				
Ratake:				
*87:				
Ratake part	Very poor	Very poor	Poor	
Rock outcrop part.				
Redfeather:				
88	Very poor	Very poor	Poor	Very poor
Renohill:				
89, 90	Fair	Good	Fair	
*91:				
Renohill part	Fair	Good	Fair	
Midway part	Poor	Fair	Fair	
Riverwash:				
92	Very poor	Very poor	Poor	
Rock outcrop:				
93.				
Satanta:				
94, 95, 96, 97	Fair	Good	Fair	
Satanta Variant:				
98	Good	Good	Fair	
Schofield:				
*99:				
Schofield part	Poor	Poor	Good	Good
Redfeather part	Very poor	Very poor	Poor	Very poor
Rock outcrop part.				
Stoneham:				
100, 101, 102, 103	Poor	Fair	Fair	
Sunshine:				
104	Poor	Poor	Good	
Table Mountain:				
105	Fair	Fair	Fair	
Tassel:				
106	Very poor	Poor	Poor	
Thedalund:				
107, 108	Poor	Poor	Fair	

potentials—Continued

Potential for habitat element	[redacted]

TABLE 4.—*Wildlife habitat*

	Potential for habitat elements [1]—