Soil and Range Resource Inventory of the

Santa Rita Experimental Range

Pima County, Arizona

Special Report

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137 pages

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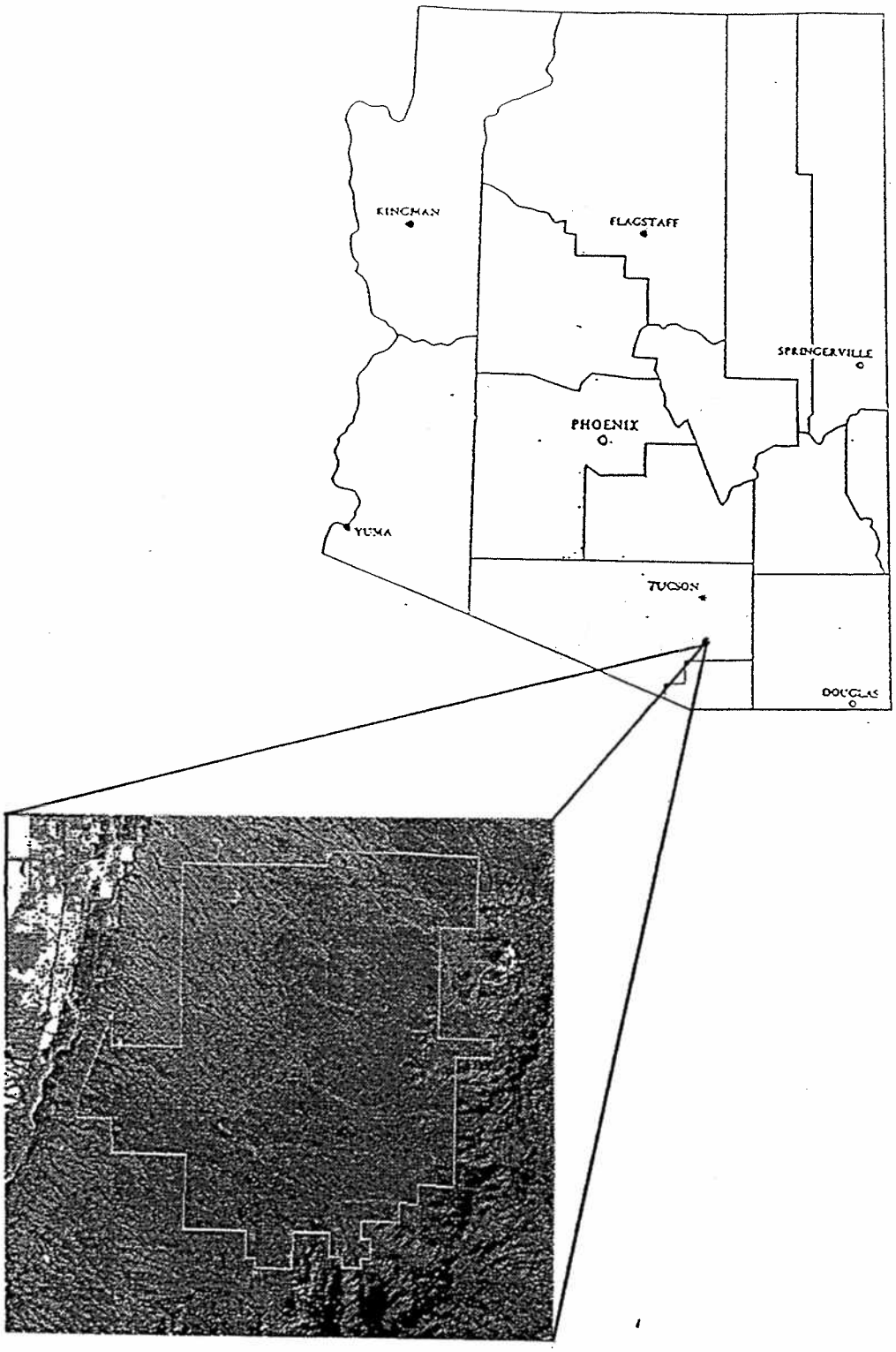
Foreward

The soil inventory is an update of soil information and soil maps of the Santa Rita Experimental Range that is within the Soil Survey of Santa Cruz and Parts of Cochise and Pima Counties, Arizona. That survey was completed in 1971 and reflects the conditions and needs at that time. The purpose of this report is to provide updated soil information and maps for the Santa Rita Experimental Range. The soil information provide in this report are soil maps, soil map unit descriptions, taxonomic unit descriptions, soil map unit legend, soil and range site legend and a soil classification legend. The soil map unit descriptions content will include map unit name, setting, composition, inclusions, typical profile description, soil properties and qualities, and interpretive groups. Soil taxonomic unit descriptions will include soil series name, setting, classification, typical pedon (detailed soils description), and range of characteristics. Soil interpretations are not being provide due to time limitations and were not asked for.

Due to the time limitations to complete this investigation several soil series and map units were used from soil surveys from the surrounding area. Those soil series and map units used from the surrounding area soil surveys have the same soil range in characteristics and properties that were observed on the Santa Rita Experimental Range. Soil maps in this investigation and soil information may be copied without permission. Enlargements of soil maps, however, could cause misunderstanding of the detail of the map. If enlarged, distortion will occur. Enlarged maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

This report is advanced soil survey information and is subject to changes upon the completion, correlation and publication of an update of the Soil Survey of Santa Cruz and parts of Cochise and Pima Counties, Arizona.



Location map, Santa Rita Experimental Range in southern Arizona

Santa Rita Experimental Range
Soil Legend

AgA	Agustin sandy loam, 0 to 3 percent slopes
ArA	Arizo - Riverwash complex, 0 to 3 percent slopes
BcB	Baboquivari - Combate complex, 1 to 5 percent slopes
BrC	Bodecker - Riverwash complex, 1 to 3 percent slopes
BwE	Budlamp - Woodcutter complex, 15 to 60 percent slopes
CaB	Caralampi sandy loam, 1 to 8 percent slopes
CrC	Cave - Rillino - Nahda complex, 1 to 10 percent slopes
ClC	Chiricahua - Lampshire complex, 3 to 18 percent slopes
CoB	Combate loamy sand, 1 to 8 percent slopes
CdB	Combate - Diaspar complex, 1 to 5 percent slopes
HbA	Hayhook - Bucklebar complex, 0 to 3 percent slope
HpB	Hayhook - Pajarito complex, 0 to 5 percent slopes
KrA	Keysto - Riverwash complex, 1 to 3 percent slope
LpE	Lampshire - Pantak complex, 10 to 60 percent slope
LbEv*	Lampshire tax. - Budlamp tax. - Woodcutter tax.. complex, 15 to 60 percent slopes
MrE	Mabray - Rock outcrop complex, 10 to 60 percent slopes
NsE	Nahda - Rillino complex, 1 to 30 percent slopes
OvA	Oversight fine sandy loam, 1 to 3 percent slopes
PsC	Pinalino - Stagecoach complex, 3 to 15 percent slopes
SbC	Sasabe - Baboquivari complex, 1 to 8 percent slopes
ToB	Tombstone complex, 0 to 5 percent slopes
TsC	Topawa complex, 1 to 8 percent slopes
TuA	Tubac complex, 0 to 2 percent slopes
WeC	White House - Eloma complex, 1 to 10 percent slopes

*All three soils in this map unit are taxadjuncts. The soil properties of these three soils are outside of the recognized soil series, by one or more differentiating characteristics of the series. These three taxadjunct soils could potentiality be new soil series if a significant area is eventually recognized.

Santa Rita Experimental Range
Soil and Range Legend

AgA Agustin sandy loam, 0 to 3 percent slopes
Agustin - Limy Fan, 10 to 13" p.z.

ArA Arizo - Riverwash complex, 0 to 3 percent slopes
Arizo - Sandy Bottom, 10 to 13" p.z.

BcB Baboquivari - Combate complex, 1 to 5 percent slopes
Baboquivari - Sandy Loam Upland, 12 to 16" p.z.
Combate - Sandy Loam, Deep, 12 to 16" p.z.

BrC Bodecker - Riverwash complex, 1 to 3 percent slopes
Bodecker - Sandy Bottom, 12 to 16" p.z.

BwE Budlamp - Woodcutter complex, 15 to 60 percent slopes
Budlamp and Woodcutter - Shallow Hills, 16 to 20" p.z.

CaB Caralampi sandy loam, 1 to 8 percent slopes
Caralampi - Sandy Loam Upland, 12 to 16" p.z.

CrC Cave - Rillino - Nahda complex, 1 to 10 percent slopes
Cave and Rillino - Limy Upland, 10 to 13 p.z.
Nahda - Loamy Upland, 10 to 13" p.z.

ClC Chiricahua - Lampshire complex, 3 to 18 percent slopes
Chiricahua and Lampshire, Shallow Upland, 12 to 16 p.z.

CoB Combate loamy sand, 1 to 8 percent slopes
Combate, Sandy Loam, Deep, 12 to 16" p.z.

CdB Combate - Diaspar complex, 1 to 5 percent slopes
Combate - Sandy Loam, Deep, 12 to 16" p.z.
Diaspar - Sandy Loam Upland, 12 to 16" p.z.

HbA Hayhook - Bucklebar complex, 0 to 3 percent slope
Hayhook - Sandy Loam, Deep, 10 to 13" p.z.
Bucklebar - Sandy Loam Upland, 10 to 13" p.z. and Loamy Upland, 10 to 13" p.z.

HpB Hayhook - Pajarito complex, 0 to 5 percent slopes
Hayhook - Sandy Loam, Deep, 10 to 13" p.z.
Pajarito - Sandy Loam, Deep, 10 to 13" p.z. and Limy Fan, 10 to 13" p.z.

KrA Keysto - Riverwash complex, 1 to 3 percent slope
Keysto - Sandy Bottom, 12 to 16" p.z.

LpE Lampshire - Pantak complex, 10 to 60 percent slope
Lampshire and Pantak - Granitic Hills, 12 to 16" p.z.

LbEv* Lampshire tax. - Budlamp tax. - Woodcutter tax. complex, 15 to 60 percent slopes
Lampshire, Budlamp and Woodcutter - Shallow Hills, 16 to 20" p.z.

MrE Mabray - Rock outcrop complex, 10 to 60 percent slopes
Mabray - Limestone Hills, 12 to 16" p.z.

NsE Nahda - Rillino complex, 1 to 30 percent slopes
Nahda - Loamy Upland, 10 to 13" p.z.
Rillino - Limy Slopes, 10 to 13" p.z.

OvA Oversight fine sandy loam, 1 to 3 percent slopes
Oversight - Sandy Bottom, 16 to 20" p.z.

PsC Pinalino - Stagecoach complex, 3 to 15 percent slopes
Pinalino - Loamy Upland, 10 to 13" p.z.
Stagecoach - Limy Slopes, 10 to 13" p.z.

SbC Sasabe - Baboquivari comlpex, 1 to 8 percent slopes
Sasabe - Sandy Loam Upland, 12 to 16" p.z. and Loamy Upland, 12 to 16" p.z.
Baboquivari - Sandy Loam Upland, 12 to 16" p.z.

ToB Tombstone complex, 0 to 5 percent slopes
Tombstone - Limy Fan, 12 to 16" p.z.

TsC Topawa complex, 1 to 8 percent slopes
Topawa - Sandy Loam Upland, 10 to 13" p.z. and Loamy Upland, 10 to 13" p.z.

TuA Tubac complex, 0 to 2 percent slopes
Tubac - Clay Loam Upland, 10 to 13" p.z. and Loamy Upland, 10 to 13" p.z.

WeC White House - Eloma complex, 1 to 10 percent slopes
White House and Eloma - Loamy Upland, 12 to 16" p.z.

*All three soils in this map unit are taxadjuncts. The soil properties of these three soils are outside of the recognized soil series, by one or more differentiating characteristics of the series. These three taxadjunct soils could potentiality be new soil series if a significant area is eventually recognized.

Santa Rita Experimental Range
Range Site Legend

Two Major Land Resource Areas (MLRA) are represented on the Santa Rita Experimental Range. MLRA 40-1 is upper Sonoran Desert with a 10-13 inch ppt. zone. MLRA 41 has two subdivisions on the Santa Rita Experimental Range. MLRA 41-3 is semi-desert grassland with a 12-16 inch ppt zone and MLRA 41-1 is Oak Savannah grassland with a 16-20 inch ppt. zone.

Map Symbol	RangeSite	Narrative

1. **Limy fan 10-13 pz** - This range site is mostly in good range condition with scores in the mid 60s. (SRER 4,15 SM 2)
2. **Sandy bottom 10-13 pz** - This range site is mostly in high fair to low good range condition with scores about 50 (SRER 2 SM 14)
3. **Limy upland - Loamy upland 10-13 pz** - This complex of range sites is about 65% Limy upland and 15% Loamy upland. Range condition on Limy upland is low good with scores about 50. Range condition on Loamy upland is fair with scores about 35. (SRER 8 SM 2)
4. **Sandyloam, deep - Sandyloam upland - Loamy upland 10-13 pz** - This range complex of range sites is about 40% Sandyloam, deep about 40% Sandyloam upland and about 20% Loamy upland. Range condition on the Sandyloam, deep range site is fair with scores about 30. Range condition on the Sandyloam upland site ranges from poor to good with scores from 20 to 60, depending on how much Lehmann lovegrass is in the plant community. Range condition on Loamy upland is mostly poor. (SRER 1,2,16,21, SM 1, 9, 10)
5. **Sandyloam, deep - Limy fan 10-13 pz** - This complex of range sites is about 70% Sandyloam, deep and 10% Limy fan. Range condition on the Sandyloam, deep ranges from good to excellent with scores from 65 to 75. Range condition on the Limy fan is good with scores in the mid 60s. (SRER 3,19 SM 16 DR 3 ARS 5,6)
6. **Loamy upland - Limy slopes 10-13 pz** - This complex of range sites is about 45% Loamy upland and 35% Limy slopes. Range condition on the Loamy upland site is fair with scores from 35 to 45 (condition is good in Gravelly Ridge exclosure - score 61). Range condition on the Limy slopes site ranges from high fair to excellent with scores from 45 to 85. (SRER 11,12, 26, 27, 38)
7. **Sandyloam upland - Loamy upland 10-13 pz** - This complex of range sites is about 55% Sandyloam upland and 20% Loamy upland. Range condition on the Sandyloam upland site ranges from poor to fair with scores of 20 to 30. Range condition on the Loamy upland site is from poor to good with scores of 15 to 55. Both sites are dominated by Lehmann lovegrass in varying amounts. (SRER 22, 23, 28, 39 SM 17)
8. **Clayloam upland - Loamy upland 10-13 pz** - This complex of ranges sites is about 40% Clayloam upland and 30% Loamy upland. Range condition on the Clayloam upland site is very poor with most areas nearly barren. Range condition on the Loamy upland site is low good with scores about 55. (SRER 6)
9. **Sandyloam upland - Sandyloam, deep 12-16 pz** - This complex of range sites is 45% Sandyloam upland and 45% Sandyloam, deep. Range condition on the Sandyloam upland ranges from poor to fair (depending on the amount of Lehmann lovegrass) with scores from 10 to 45. Range condition on the Sandyloam, deep also ranges from poor to fair with scores from 13 to 30. The higher scores are from those areas that burned in 1994 removing some mesquite and all burroweed. It is also dominated by Lehmann lovegrass. (SRER 29, 33, 40 ARS 1, 2, 3, 4 SM 7, 8, 17)
10. **Sandy bottom 12-16 pz** - This range site is mostly in fair range condition with scores from 28 to 44. (SRER 30,35 SM 23)
11. **Sandyloam upland 12-16 pz** - This range site is mostly in poor range condition dominated by Lehmann lovegrass.
12. **Shallow upland 12-16 pz** - This range site ranges from poor to good range condition with scores in the 20's where Lehmann is dominant to scores over 50 where natives are dominant. (SRER 18)
13. **Sandyloam, deep 12-16 pz** - This range site ranges in condition from low fair to high good (condition is excellent inside exclosure #22) with scores from 20 to 59. High scoring areas are still dominated by native grasses. Low scoring areas are dominated by Lehmann lovegrass. (DR 1, 2, 4, 5, 6, 7, 8 SRER 37)
14. **Granitic hills 12-16 pz** - This range site is mostly in fair to good range condition with scores from the mid 30's to the low 70's. The highest scores come from areas that have burned recently (reducing shrub covers). (SRER 15, 41 SM 11, 12)

15. **Limestone hills 12-16 pz** - This range site is mostly in high fair range condition with scores in the mid 40's. It has become shrubby in the absence of fire. (SM 13)
16. **Loamy upland - Sandyloam upland 12-16 pz** - This complex of range sites is about 55% Loamy upland and 35% Sandyloam upland. The Loamy upland site ranges from poor condition (dominated by Lehmann lovegrass) to low good condition where natives still dominate (scores from 15 to 54). The Sandyloam upland range site is mostly in poor to fair condition with scores from 6 to 33. It is dominated by velvet mesquite and Lehmann lovegrass nearly everywhere. (SRER 7, 13, 36, 41, 42 ARS 7, 9, 10 SM 6, 5, 21. 22)
17. **Limy fan 12-16 pz** - This range site is transitional from MLRA 40 to 41. No site description has been developed for it in MLRA 41-3. The site appears to be in low good range condition with a dominance of mesquite, creosotebush and native forbs and grasses. (SRER 9 SM 3)
18. **Loamy upland 12-16 pz** - This range site is mostly in poor range condition, dominated by Lehmann lovegrass, with scores ranging from 15 to 25. On steeper side slopes it is in fair range condition with good representation of native grasses and scores in the mid 30's. (SRER 16, 17, 31, 32 SM 18)
19. **Sandy bottom 16-20 pz** - This woodland site appears to be in good condition with a stable channel and terraces dominated by oak, hackberry, mesquite and an occasional walnut, ash and sycamore.
20. **Shallow hills 16-20 pz** - This range site appears to be in good condition. The native potential plant community is largely intact is the few areas of this site within the Santa Rita Experimental Range boundaries. (SM 20)
21. **Granitic hill - Shallow hills 12-16 pz** - This complex of range sites is about 40% Granitic hills 12-16 pz on warm exposures and 40% Shallow hills 16-20 pz on cooler aspects. Small areas at the highest elevations on steep north exposures are woodland sites which occur as inclusions in this unit. Range condition on the Granitic hills 12-16 pz site is fair. These areas are dominated by heavy stands of ocotillo, prickley pear, mimosa and mesquite. Range condition on the Shallow hills 16-20 pz site are high fair to low good. Understory vegetation is dominated by shrubs like sotol, mimosa, prickley pear and kidney wood. In both sites periodic fire is needed to restore the balance to the native plant community. (SM 19, 20)

AgA Agustin sandy loam, 0 to 3 percent slopes

Setting

Landform: fan terrace
Slope range: 0 to 3 percent
Hazard of flooding: none
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 66 to 70 degrees F.
Frost-free period: 210 to 240 days

Composition

Agustin and similar soils: 80 percent
Inclusions: 20 percent
(this is an approximate percentage)

Typical Profile

Agustin
Surface coarse fragments: 5 to 15 percent gravel
0 to 5 cm - yellowish brown sandy loam
5 to 14 cm - brown sandy loam
14 to 84 cm - pale brown sandy loam to fine sandy loam (calcareous)
84 to 121 cm - pale brown gravelly coarse sandy loam (calcareous)
121 to 150 cm - yellowish brown loam (calcareous)

Inclusions

Contrasting inclusions:
- Arizo soils in drainageways
- calcareous soils that have greater than 18 percent clay
- calcareous soils that have coarse fragments greater than 35 percent
- Tubac soils that have greater than 35 percent clay
- slopes greater than 3 percent; these slopes can also have surface gravel contents of 35 to 45 percent

Soil Properties and Qualities

Agustin
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: moderately rapid
Available water capacity: low to moderate
Hazard of erosion:
- by water - slight
- by wind - moderate high

Hydrologic group: B
Runoff: slow
Rock fragments: averages less than 15 percent in the control section

Interpretive Groups

Land capability classification:
Agustin - nonirrigated VIIc

Range site:
Agustin - Limy Fan, 10 to 13" p.z.

Vegetation: Creosotebush is the dominate species in the plant community. Important subdominants include bush muhly, fluffgrass, desert zinnia, Pima pappusgrass, desert holly, lichens, mosses and algae. The endangered Pima pineapple cactus is common on this soil.

ArA Arizo - Riverwash complex, 0 to 3 percent slopes

Setting

Landform: flood plains, drainageways, inset fans
Slope range: 0 to 3 percent
Hazard of flooding: Arizo - rare, Riverwash - common
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 66 to 70 degrees F.
Frost-free period: 210 to 240 days

Composition

Arizo and similar soils: 65 percent
Riverwash and similar soils: 25 percent
Inclusions: 10 percent
(this is an approximate percentage)

Typical Profile

Arizo
Surface coarse fragments: 5 to 15 percent gravel and cobbles
0 to 46 cm - yellowish brown gravelly loamy sand
46 to 150 cm - yellowish brown very gravelly loamy sand

Inclusions

Contrasting inclusions
- Hayhook and Agustin soils that have less than 35 percent coarse fragments
- soils that are sandy that have less than 35 percent coarse fragments
- soils that have buried paleosols at moderate depths

Soil Properties and Qualities

Arizo
Parent material: mixed
Depth class: very deep
Drainage class: excessively drained
Permeability: rapid
Available water capacity: very low
Hazard of erosion:
by water - slight
by wind - moderately high
Hydrologic group: A
Slope range: 0 to 3 percent
Runoff: very slow to slow
Rock fragments: averages 35 to 55 percent in the control section

Riverwash
Riverwash consists of unconsolidated material in the channel of an ephemeral stream, commonly bordered by steep to vertical banks cut into

the alluvium (Arizo soil). It is usually dry but can be transformed into a temporary watercourse or a short-lived torrent after a heavy rain within the watershed.

Interpretive Groups

Land capability classification
Arizo - nonirrigated VIw

Range site
Arizo - Sandy Bottom, 10 to 13" p.z.

Vegetation: The dominate vegetation on this site are trees and large shrubs including mesquite, catclaw acacia, desert hackberry, fourwing saltbush, wolfberry and graythorn. Important grasses include bush muhly, Arizona cottontop, spike dropseed, Pima pappusgrass, threeawn and two flower trichloris. Common forbs are desert tobacco, ragweed, wishbone plant, tetramerium, bricklebush and annuals. In some places Lehmann and Boers lovegrass, common bermudagrass and bufflegrass have invaded the native understory.

BcB Baboquivari - Combate complex, 1 to 5 percent slopes

Setting

Landform: alluvial fan, fan terrace
Slope range: 1 to 5 percent
Hazard of flooding: Baboquiviri - none, Combate - none to rare
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F.
Frost-free period: 180 to 230 days

Composition

Baboquivari and similar soils: 60 percent
Combate and similar soils: 25 percent
Inclusions: 15 percent
(this is an approximate percentage)

Typical Profile

Baboquivari
Surface coarse fragments: 5 to 10 percent gravel
0 to 8 cm - dark yellowish brown loamy sand
8 to 20 cm - brown coarse sandy loam
20 to 81 cm - dark brown gravely sandy clay loam
81 to 150 cm - yellowish red sandy clay loam

Combate
Surface coarse fragments: 5 to 15 percent gravel
0 to 5 cm - brown loamy sand
5 to 120 cm - dark brown to brown coarse sandy loam to sandy loam

Inclusions

Contrasting inclusions:
- soils that are shallow to bedrock
- Bodecker and Keysto soils that are in drainageways
- Sasabe and White House soils that have greater than 35 percent clay
- Combate soils that have loamy sand textures

Soil Properties and Qualities

Baboquivari
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: moderately slow
Available water capacity: moderate
Hazard of erosion:
  by water - slight
  by wind - moderately high
Hydrologic group: B

Slope range: 1 to 5 percent
Runoff: slow
Rock fragments: averages 5 to 25 percent in the control section

Combate
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: Moderately rapid
Available water capacity: low
Hazard of erosion:
by water - slight to moderate
by wind - moderate high
Hydrologic group: B
Slope range: 1 to 5 percent
Runoff: slow
Rock fragments: 5 to 15 percent

Interpretive Groups

Land capability classification
Baboquivari and Combate - nonirrigated VIe

Range site
Baboquivari - Sandy Loam Upland, 12 to 16" p.z.
Combate - Sandy Loam, Deep, 12 to 16" p.z.

Vegetation:
Baboquivari - The dominate species on this soil include mesquite, Lehmann lovegrass and burroweed. The native midgrasses are reduced to minor amounts if even present and include Arizona cottontop, plains bristlegrass, sideoats grama, threeawn and black grama.

Combate - Over most of the area of this soil in this map unit the dominate species are mesquite, Lehmann lovegrass and burroweed. In places not yet invaded by Lehmann lovegrass the native grasses are still dominate include bush muhly, Santa Rita threeawn, tanglehead, Arizona cottontop, black grama, slender grama and sideoats.

Fires that burned through much of this unit in the summer of 1994 removed burroweed, killed a high percentage of very young mesquite and 20 percent of the oldest mesquite trees and top killed the rest of the mesquite trees.

BrC Bodecker - Riverwash complex, 1 to 3 percent slopes

Setting

Landform: inset fan, stream terraces
Slope range: 1 to 3 percent
Hazard of flooding: Bodecker - rare, Riverwash - common
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F.
Frost-free period: 180 to 230 days

Composition

Bodecker and similar soils: 65 percent
Riverwash and similar soils: 25 percent
Inclusions: 10 percent
(this is an approximate percentage)

Typical Profile

Bodecker
Surface coarse fragments: 5 to 25 percent gravel and cobbles
0 to 8 cm - brown loamy fine sand
8 to 150 cm - brown stratified gravelly sand and very gravelly coarse sand

Inclusions

Contrasting inclusions
- soils that are shallow to bedrock
- Combate soils that have less than 15 percent coarse fragments
- sandy soils that have less than 15 percent coarse fragments
- soils that have buried paleosols at shallow to moderate depths

Soil Properties and Qualities

Bodecker
Parent material: mixed
Depth class: very deep
Drainage class: excessively drained
Permeability: very rapid
Available water capacity: very low
Hazard of erosion:
- by water - slight
- by wind - high

Hydrologic group: A
Slope range: 1 to 3 percent
Runoff: slow
Rock fragments: averages more than 35 percent in the control section

Riverwash
Riverwash consists of unconsolidated material in the channel of an ephemeral stream, commonly bordered by steep to vertical banks cut into

the alluvium (Bodecker soil). It is usually dry but can be transformed into a temporary watercourse or a short-lived torrent after a heavy rain within the watershed.

Interpretive Groups

Land capability classification
Bodecker - nonirrigated VIe

Range site
Bodecker - Sandy Bottom, 12 to 16" p.z.

Vegetation: The dominate vegetation on this site are trees and large shrubs including mesquite, catclaw acacia, desert hackberry, burroweed, desert honeysuckle, southwest rabbitbrush, virgins bower and desert broom. In many places Lehmann and Boers lovegrasses have invaded and dominate the understory. In other areas native grasses include sideoats grama, cane beardgrass, spike dropseed, Arizona cottontop, tanglehead, bush muhly and threeawns still dominate the understory.

BwE Budlamp - Woodcutter complex, 15 to 60 percent slopes

Setting

Landform: hills and mountains
Slope range: 15 to 60 percent
Hazard of flooding: none
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 60 to 67 degrees F.
Frost-free period: 180 to 230 days

Composition

Budlamp and similar soils: 40 percent
Woodcutter and similar soils: 30 percent
Inclusions: 20 percent
(this is an approximate percentage)

Typical Profile

Budlamp
Surface coarse fragments: 35 to 45 percent gravel and cobbles
0 to 5 cm - dark brown very gravelly sandy loam
5 to 20 cm - very dark grayish brown extremely gravelly fine sandy loam
20 cm - unweathered bedrock

Woodcutter
Surface coarse fragments: 35 to 45 percent gravel, cobbles and stones
0 to 5 cm - brown very gravelly fine sandy loam
5 to 15 cm - dark brown very gravelly loam
15 to 30 cm - reddish brown very gravelly clay loam
30 cm - unweathered bedrock

Inclusions

Contrasting inclusions
- soils that are moderately deep to deep to bedrock
- Chiricahua soils that have over 35 percent clay

Soil Properties and Qualities

Budlamp
Parent material: slope alluvium, colluvium and residuum
Depth class: very shallow to shallow
Drainage class: well
Permeability: Moderately rapid
Available water capacity: very low
Hazard of erosion:
- by water - moderate to severe
- by wind - slight

Hydrologic group: D
Slope range: 20 to 60 percent
Runoff: very rapid

Rock fragments: averages 35 to 70 percent in the control section

Woodcutter
Parent material: slope alluvium and residuum
Depth class: very shallow to shallow
Drainage class: well
Permeability: moderately slow
Available water capacity: very low
Hazard of erosion:
by water - moderate to severe
by wind - slight
Hydrologic group: D
Runoff: medium to very rapid
Slope range: 10 to 40 percent
Rock fragments: averages 35 to 50 percent in the control section

Interpretive Groups

Land capability classification
Budlamp and Woodcutter, 15 to 30 percent slopes - nonirrigated VIs
Budlamp and Woodcutter, 30 to 60 percent slopes - nonirrigated VIe

Range site
Budlamp and Woodcutter - Shallow Hills, 16 to 20" p.z.

Vegetation: On both soils native grasses dominate the plant community. The main grasses are sideoats grama, hairy grama, plains lovegrass, Texas bluestem, beggartick threeawn, crinkleawn and green sprangletop. Important shrubs include shrubby buckwheat, mimosa, herbaceous sage, goldeneye, sotol and agave, Mexican blue oak, Emory oak and oneseed juniper are scattered on cool aspects on this site.

CaB Caralampi sandy loam, 1 to 8 percent slopes

Setting

Landform: fan terrace
Slope range: 1 to 8 percent
Hazard of flooding: none
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F.
Frost-free period: 180 to 230 days

Composition

Caralampi and similar soils: 75
Inclusions: 25 percent
(this is an approximate percentage)

Typical Profile

Caralampi
Surface coarse fragments: 5 to 25 percent gravel and cobbles
0 to 15 cm - brown sandy loam to gravelly sandy loam
15 to 30 cm - reddish brown very gravelly sandy clay loam
30 to 112 cm - reddish brown very cobbly clay loam
112 to 150 cm - reddish brown extremely cobbly sandy clay loam to extremely cobbly sandy loam

Inclusions

Contrasting inclusions:
- Keysto soils that are in drainageways
- White House and Eloma soils that have more than 35 percent clay
- Combate and Diaspar soils that have less than 20 percent clay
- slopes greater than 8 percent

Soil Properties and Qualities

Caralampi
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: moderately slow
Available water capacity: moderately high
Hazard of erosion:
by water - slight to moderate
by wind - slight
Hydrologic group: B
Slope range: 1 to 8 percent
Runoff: slow to medium
Rock fragments: averages 35 to 80 percent in the control section

Interpretive Groups

Land capability classification:
Caralampi - nonirrigated VIc

Range site:
Caralampi - Sandy Loam Upland, 12 to 16" p.z.

Vegetation: The dominate vegetation on this soil is mesquite, Lehmann lovegrass and burroweed. Native grasses and forbs occur in minor amounts and include black grama, slender grama, Arizona cottontop, threeawn, plains bristlegrass and bush muhly.

CrC Cave - Rillino - Nahda complex, 1 to 10 percent slopes

Setting

Landform: fan terrace
Slope range: 1 to 10 percent
Hazard of flooding: none
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 66 to 70 degrees F.
Frost-free period: 210 to 240 days

Composition

Cave and similar soils: 35 percent
Rillino and similar soils: 30 percent
Nahda and similar soils: 15 percent
Inclusions: 20 percent
(this is an approximate percentage)

Typical Profile

Cave
Surface coarse fragments: 30 to 40 percent gravel and cobbles
0 to 3 cm - brown sandy loam
3 to 13 cm - brown gravelly sandy loam (calcareous)
13 to 25 cm - indurated calcium carbonate cemented hardpan

Rillino
Surface coarse fragments: 35 to 50 percent gravel and cobbles
0 to 10 cm - pinkish gray gravelly sandy loam
10 to 115 cm - brown gravelly sandy loam (calcareous)
115 to 150 cm - light brown very gravelly sandy loam (calcareous)

Nahda
Surface coarse fragments: 45 to 55 percent gravel and cobbles
0 to 8 cm - reddish brown gravelly sandy loam
8 to 23 cm - dark reddish brown gravelly sandy clay
23 to 61 cm - reddish brown very gravelly clay
61 to 87 cm - light reddish brown very gravelly sandy loam (calcareous)
87 to 100 cm - indurated calcium carbonate hardpan

Inclusions

Contrasting inclusions
- Arizo soils that are in drainageways
- slopes greater than 10 percent
- soils that are shallow to moderately deep to bedrock
- soils similar to Cave and Rillino that have greater than 35 percent coarse fragments

Soil Properties and Qualities

Cave
Parent material: mixed
Depth class: very shallow to shallow
Drainage class: well
Permeability: moderate
Available water capacity: low
Potential rooting depth: 15 to 50 cm.
Hazard of erosion:
by water - slight
by wind - very slight
Hydrologic group: D
Slope range: 1 to 5 percent
Runoff: medium
Rock fragments: averages less 35 percent in the control section

Rillino
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: moderate
Available water capacity: low
Hazard of erosion:
by water - slight
by wind - moderate
Hydrologic group: B
Runoff: medium
Slope range: 3 to 10 percent
Rock fragments: averages 15 to 35 percent in the control section

Nahda
Parent material: mixed
Depth class: moderately deep
Drainage class: well
Permeability: slow
Available water capacity: low to moderate
Potential rooting depth: 50 to 100 cm.
Hazard of erosion:
by water - slight
by wind - very slight
Hydrologic group: C
Slope range: 1 to 10 percent
Runoff: slow to medium
Rock fragments: averages greater than 35 percent in the control section

Interpretive Groups

Land capability classification
Cave and Nahda - nonirrigated VIIs
Rillino - nonirrigated VIIe

Range site

Cave and Rillino - Limy Upland, 10 to 13" p.z.
Nahda - Loamy Upland, 10 to 13" p.z.

Vegetation:

Cave and Rillino - The dominant plant species on these soils include creosotebush, whitethorn acacia and mesquite. Other common shrubs are range ratany, desert zinnia, mariola, ratear coldenia, rock hibiscus and twinberry. The maingrasses are bush muhly, blue threeawn, fluffgrass and black grama. Common forbs are croton, bahia, dutchmans britches, desert holly, ditaxis, ragweed, training four o'clock and spiny haplopappus. Ocotillo, cholla species, barrel cactus, hedgehog cactus and pincushion are common.

Nahda - The dominate vegetation on this soil is mesquite, whitethorn acacia and ocotillo. The main small shrubs include range ratany, slender janusia, yerba del venado, false mesquite, twinberry, snakeweed and desert zinnia. Common perennial grasses include red grama, purple threeawn, bush muhly, black grama and curly mesquite. Cholla and prickly pear cactus can be heavy in places.

The endangered Pima pineapple cactus occurs throughout this mapping unit.

ClC Chiricahua - Lampshire complex, 3 to 18 percent slopes

Setting

Landform: hill
Slope range: 3 to 18 percent
Hazard of flooding: none
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F.
Frost-free period: 180 to 230 days

Composition

Chiricahua and similar soils: 60 percent
Lampshire and similar soils: 20 percent
Inclusions: 20 percent
(this is an approximate percentage)

Typical Profile

Chiricahua
Surface coarse fragments: 10 to 35 percent gravel, cobbles and stones
0 to 8 cm - dark brown cobbly sandy loam
8 to 28 cm - dark reddish brown gravelly heavy clay loam or clay
28 to 48 cm - dark reddish brown gravelly clay loam
48 to 71 cm - weathered bedrock
71 cm - unweathered bedrock

Lampshire
Surface coarse fragments: 15 to 35 percent gravel, cobbles and stones
0 to 20 cm - very dark gray very cobbly loam
20 cm - unweathered bedrock

Inclusions

Contrasting inclusions
- soils that are deep to bedrock
- Pantak soils that have less 35 percent clay
- slopes greater than 18 percent
- rock outcrop

Soil Properties and Qualities

Chiricahua
Parent material: slope alluvium and residuum
Depth class: shallow
Drainage class: well
Permeability: slow
Available water capacity: low
Potential rooting depth: 50 to 76 cm.
Hazard of erosion:
- by water - slight to moderate
- by wind - very slight

Hydrologic group: D
Runoff: medium to rapid
Slope range: 3 to 18 percent
Rock fragments: averages 10 to 35 percent in the control section

Lampshire
Parent material: slope alluvium, colluvium and residuum
Depth class: very shallow to shallow
Drainage class: well
Permeability: Moderately rapid
Available water capacity: very low
Potential rooting depth: 10 to 50 cm.
Hazard of erosion:
by water - moderate to severe
by wind - very slight
Hydrologic group: D
Slope range: 3 to 18 percent
Runoff: very rapid
Rock fragments: averages 35 to 45 percent in the control section

Interpretive Groups

Land capability classification
Chiricahua - nonirrigated VIs
Lampshire - nonirrigated VIe

Range site
Chiricahua and Lampshire - Shallow Upland, 12 to 16" p.z.

Vegetation: The dominate vegetation these soils consist of native grasses and low shrubs with scattered mesquite and ocotillo. The main grasses include curly mesquite, sideoats, black grama, hairy grama, sprucetop grama, tanglehead, plains lovegrass, wolftail, bush muhly, cane beardgrass and Arizona cottontop. Common shrubs are ratany, shrubby buckwheat, false mesquite, mimosa, sotol, agave, dalea, prickly pear cactus and rainbow cactus. In a few places Lehmann lovegrass has invaded and dominates the plant community.

CoB - Combate loamy sand, 1 to 8 percent slopes

Setting

Landform: alluvial fan
Slope range: 1 to 8 percent
Hazard of flooding: none to rare
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F.
Frost-free period: 180 to 230 days

Composition

Combate and similar soils: 90 percent
Inclusions: 10 percent
(this is an approximate percentage)

Typical Profile

Combate
Surface coarse fragments: 5 to 15 percent gravel
0 to 5 cm - brown loamy sand
5 to 120 cm - dark brown to brown coarse sandy loam to sandy loam

Inclusions

Contrasting inclusions
- Bodecker and Keysto soils in drainageways
- Baboquivari and Sasabe soils that have greater than 18 percent clay
- Combate soils that have loamy sand textured subsoils

Soil Properties and Qualities

Combate
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: moderately rapid
Available water capacity: low
Hazard of erosion:
by water - slight to moderate
by wind - moderate high
Hydrologic group: B
Runoff: slow
Rock fragments: averages 5 to 15 percent in the control section

Interpretive Groups

Land capability classification:
Combate - nonirrigated VIc

Range site:
Combate - Sandy Loam, Deep, 12 to 16" p.z.

Vegetation: The dominate vegetation on this soil over most of the area is mesquite, desert hackberry, burroweed, and native grasses. The main grasses are bush muhly, Arizona cottontop, tanglehead, black grama, slender grama, Rothrock grama, Santa Rita threeawn and spidergrass. Common forbs include poppy, lupine, caltrop, evolvulous, spiderling, tidestromia and Indian wheat. In places Lehmann lovegrass is invading this soil and becoming dominate in the herbaceous layer. The endangered Pima pineapple cactus occurs on this mapping unit.

CdB Combate - Diaspar complex, 1 to 5 percent slopes

Setting

Landform: alluvial fan, fan terrace
Slope range: 1 to 5 percent
Hazard of flooding: none to rare
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F.
Frost-free period: 180 to 230 days

Composition

Combate and similar soils: 65 percent
Diaspar and similar soils: 25 percent
Inclusions: 15 percent
(this is an approximate percentage)

Typical Profile

Combate
Surface coarse fragments: 5 to 20 percent gravel
0 to 5 cm - brown loamy sand
5 to 120 cm - dark brown to brown coarse sandy loam to sandy loam

Diaspar
Surface coarse fragments: 5 to 20 percent gravel
0 to 13 cm - brown loamy sand to coarse sandy loam
13 to 115 cm - brown sandy loam to coarse sandy loam
115 to 140 cm - brown sandy loam

Inclusions

Contrasting inclusions
- Baboquivari soils that have greater than 18 percent clay
- Sasabe soils that have greater than 35 percent clay
- sandy soils that are in drainageways
- soils that are shallow to bedrock
- soils that have over 35 percent coarse fragments
- Combate soils that have loamy sand to gravelly loamy sand textured subsoils
- Combate soils that have buried paleosols at moderate depths

Soil Properties and Qualities

Combate
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: Moderately rapid
Available water capacity: low

Hazard of erosion:
by water - slight to moderate
by wind - moderate high
Hydrologic group: B
Slope range: 1 to 3 percent
Runoff: slow
Rock fragments: averages 5 to 15 percent in the control section

Diaspar
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: moderately rapid to moderate
Available water capacity: moderate
Hazard of erosion:
by water - slight
by wind - moderately high
Hydrologic group: B
Runoff: medium
Slope range: 1 to 5 percent
Rock fragments: average 5 to 15 percent in the control section

Interpretive Groups

Land capability classification
Combate and Diaspar - nonirrigated VIe

Range site
Combate - Sandy Loam, Deep, 12 to 16" p.z.
Diaspar - Sandy Loam Upland, 12 to 16" p.z.

(Diaspar soil is transitional from Sandy Loam, Deep to Sandy Loam Upland range site)

Vegetation
Combate - The dominant plants on this soil are mesquite, Lehmann lovegrass, and burroweed. In places, native grasses are still present in minor amounts including Arizona cottontop, Santa Rita threeawn, bush muhly and Rothrock grama.
Diaspar - The plant community is dominated by mesquite, Lehmann lovegrass, and burroweed. Native grasses and forbs occur only in trace amounts.

HbA Hayhook - Bucklebar soils complex, 0 to 3 percent slopes

Setting

Landform: fan terrace
Slope range: 0 to 3 percent
Hazard of flooding: none
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 66 to 70 degrees F.
Frost-free period: 210 to 240 days

Composition

Hayhook and similar soils: 50 percent
Bucklebar and similar soils: 40 percent
    Bucklebar (thin surface): 25 percent of the 40 percent
    Bucklebar (thick surface): 15 percent of the 40 percent
Inclusions: 10 percent
(this is an approximate percentage)

Typical Profile

Hayhook
Surface coarse fragments: 5 to 15 percent gravel
0 to 4 cm - yellowish brown loamy sand
4 to 40 cm - brown coarse sandy loam
40 to 85 cm - brown gravelly coarse sandy loam
85 to 150 cm - brown sandy loam
(illuvial calcium carbonate - noneffervescent to 50 cm. or deeper)

Bucklebar (thin surface)
Surface coarse fragments: 5 to 20 percent gravel
0 to 8 cm - brown sandy loam
8 to 76 cm - brown sandy clay loam
76 to 150 cm - yellowish red sandy clay loam

Bucklebar (thick surface)
Surface coarse fragments: 5 to 15 percent gravel
0 to 38 cm - brown sandy loam
38 to 76 cm - brown sandy clay loam
76 to 150 cm - yellowish red sandy clay loam

Inclusions

Contrasting inclusions:
- Tubac soils that have greater than 35 percent clay
- Arizo soils that are in drainageways
- soils that are calcareous throughout
- soils that have greater than 35 percent coarse fragments
- slopes greater than 3 percent

Soil Properties and Qualities

Hayhook
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: moderately rapid
Available water capacity: low to moderate
Hazard of erosion:
by water - slight to moderate
by wind - moderately high
Hydrologic group: B
Slope range: 1 to 3 percent
Runoff: slow
Rock fragments: averages 5 to 35 percent in the control section

Bucklebar
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: moderate
Available water capacity: moderately high
Hazard of erosion:
by water - slight
by wind - moderately high
Hydrologic group: B
Runoff: slow to medium
Slope range: 0 to 3 percent
Rock fragments: averages 0 to 15 percent in the control section

Bucklebar (thick surface)
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: Moderately rapid upper part and moderately slow in the lower part
Available water capacity: moderate
Hazard of erosion:
by water - slight to moderate
by wind - moderate high
Hydrologic group: B
Slope range: 1 to 3 percent
Runoff: slow
Rock fragments: averages 0 to 15 percent in the control section

Interpretive Groups

Land capability classification:

Hayhook and Bucklebar - nonirrigated VIIe

Range site:

Hayhook - Sandy Loam, Deep, 10 to 13" p.z.
Bucklebar (thick surface) - Sandy Loam, 10 to 13" p.z.
Bucklebar (thin surface) - Loamy Upland, 10 to 13" p.z.

Vegetation:

Hayhook - In most places, the plant community is dominated by mesquite, burroweed, and native grasses. The main grasses are bush muhly, Santa Rita threeawn, Arizona cottontop, Rothrock grama, and spidergrass. Common forbs are spiny haplopappus, desert marigold, spriderling, and Indian wheat. Other shrubs include desert hackberry, cholla, prickly pear, barrel cactus, hedgehog cactus, and desert zinnia. In a few areas Lehmann lovegrass has invaded the herbaceous layer.

Bucklebar (thick surface) - In most places this plant community is dominated by mesquite, Lehmann lovegrass and burroweed. Native grasses and forbs occur only in trace amounts.

Bucklebar (thin surface) - The plant community on his soil is is dominated by mesquite and other shrubs and cacti. The main species include burroweed, snakeweed, desert zinnia, cholla, prickly pear, barrel cactus, hedgehog cactus and pincushion. Perennial grasses are present but in small amounts and include bush muhly, purple threeawn, and Rothrock grama. The endangered Pima pineapple cactus occurs throughout this mapping unit.

HpB Hayhook - Pajarito complex, 0 to 5 percent slopes

Setting

Landform: fan terrace
Slope range: 0 to 5 percent
Hazard of flooding: none
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 66 to 70 degrees F.
Frost-free period: 210 to 240 days

Composition

Hayhook and similar soils: 50 percent
Pajarito and similar soils: 30 percent
Inclusions: 20 percent
(this is an approximate percentage)

Typical Profile

Hayhook
Surface coarse fragments: 2 to 15 percent gravel
0 to 4 cm - yellowish brown loamy sand
4 to 40 cm - brown sandy loam
40 to 85 cm - brown gravelly coarse sandy loam
85 to 150 cm - brown sandy loam
(illuvial calcium carbonate - noneffervescent above 50 cm or deeper)

Pajarito
Surface coarse fragments: 5 to 15 percent gravel
0 to 11 cm - brown sandy loam
11 to 40 cm - brown fine sandy loam
40 to 150 cm - yellowish brown fine sandy loam
(illuvial calcium carbonate - effervescent above 50 cm)

Inclusions

Contrasting inclusions:
- Bucklebar soils that have greater than 18 percent clay
- Tubac soils that have greater than 35 percent clay
- Arizo soils that are in drainageways
- Hayhook and Pajarito soils that have buried paleosols below 50 cm (argillic horizons)
- slopes greater than 5 percent; these slopes can also have surface gravel contents of 35 to 45 percent
- Hayhook soils that have loamy sand to gravelly loamy sand for subsoil textures

Soil Properties and Qualities

Hayhook
Parent material: mixed
Depth class: very deep

Drainage class: well
Permeability: Moderately rapid
Available water capacity: low to moderate
Hazard of erosion:
by water - slight to moderate
by wind - moderately high
Hydrologic group: B
Slope range: 1 to 5 percent
Runoff: slow
Rock fragments: averages 5 to 35 percent in the control section

Pajarito
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: moderately rapid
Available water capacity: moderate
Hazard of erosion:
by water - slight
by wind - moderately high
Hydrologic group: B
Runoff: medium
Slope range: 0 to 5 percent
Rock fragments: averages less than 15 percent in the control section

Interpretive Groups

Land capability classification:
Hayhook - Pajarito - nonirrigated VIIe

Range site:
Hayhook and Pajarito - Sandy Loam, Deep, 10 to 13" p.z.
Pajarito (effervescent above 15 cm) - Limy Fan, 10 to 13" p.z.

Vegetation:
Hayhook and Pajarito - The dominant vegetation on these soils is mesquite, desert hackberry, cacti, and burroweed with a herbaceous layer of native grasses, forbs and half shrubs. The main species are bush muhly, Santa Rita threeawn, Rothrock grama, desert zinnia, and spidergrass. In some places Lehmann lovegrass has invaded but it is not dominant anywhere.

Pajarito (effervescent above 15 cm) - The dominant vegetation on this soil is mesquite and creosotebush with lesser amounts of desert zinnia, bush muhly, fluffgrass, Pima pappusgrass, and desert holly.

The endangered Pima pineapple cactus occurs throughout this mapping unit.

KrA Keysto - Riverwash complex, 1 to 3 percent slopes

Setting

Landform: inset fan, stream terraces
Slope range: 1 to 3 percent
Hazard of flooding: Keysto - none to rare, Riverwash - common
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F.
Frost-free period: 180 to 230 days

Composition

Keysto and similar soils: 65 percent
Riverwash and similar soils: 25 percent
Inclusions: 10 percent
(this is an approximate percentage)

Typical Profile

Keysto
Surface coarse fragments: 5 to 25 percent gravel and cobbles
0 to 7 cm - brown sandy loam
7 to 150 cm - brown very cobbly sandy loam to extremely cobbly loamy sand

Inclusions

Contrasting inclusions
- soils that are shallow to bedrock
- Combate soils that have less than 15 percent coarse fragments
- Keysto soils that have buried paleosols at moderate depths

Soil Properties and Qualities

Keysto
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: rapid
Available water capacity: low
Hazard of erosion:
by water - slight
by wind - moderately high
Hydrologic group: B
Slope range: 1 to 3 percent
Runoff: slow to medium
Rock fragments: averages 35 to 65 percent in the control section

Riverwash
Riverwash consists of unconsolidated material in the channel of an ephemeral stream, commonly bordered by steep to vertical banks cut into the alluvium (Keysto soil). It is usually dry but can be transformed

into a temporary watercourse or a short-lived torrent after a heavy rain within the watershed.

Interpretive Groups

Land capability classification
Keysto - nonirrigated VIe

Range site
Keysto - Sandy Bottom, 12 to 16" p.z.

Vegetation: The plant community on this soil is dominated by trees and large shrubs including mesquite, catclaw acacia, desert willow, desert hackberry, burrobrush, southwest rabbitbush, wolfberry, greythorn, virgins bower, desert honeysuckle, brickellia and goldeneye. The main grasses are Arizona cottontop, sacaton, spike dropseed, bush muhly, tanglehead and sideoats grama. Lehmann lovegrass and Boer lovegrass occur throughout areas of this soil but do not dominate. Important forbs are wild cotton, pearly everlasting, wishbone plant, sorrel buckwheat, spiderling, tetramerium, datura, thistle, evolvulous, lambsquarter, pigweed, Indian wheat, canaigre and spiderling. In places occasional trees such as black walnut, netleaf hackberry and western soapberry occur in the community.

LpE Lampshire - Pantak - Rock outcrop complex, 10 to 60 percent slopes

Setting

Landform: hills and mountains
Slope range: 10 to 60 percent
Hazard of flooding: none
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F.
Frost-free period: 180 to 230 days

Composition

Lampshire and similar soils: 40 percent
Pantak and similar soils: 30 percent
Rock outcrop: 20
Inclusions: 10 percent
(this is an approximate percentage)

Typical Profile

Lampshire
Surface coarse fragments: 35 to 45 percent gravel, cobbles and stones
0 to 20 cm - very dark gray very gravelly sandy loam
20 cm - unweathered bedrock

Pantak
Surface coarse fragments: 35 to 55 percent gravel, cobbles and stones
0 to 3 cm - brown to dark brown very gravelly sandy loam
3 to 10 cm - brown very gravelly sandy loam
10 to 36 cm - brown very gravelly sandy clay loam
36 cm - unweathered bedrock

Inclusions

Contrasting inclusions
- soils that are moderately deep to bedrock
- Chiricahua soils that have over 35 percent clay

Soil Properties and Qualities

Lampshire
Parent material: slope alluvium, colluvium and residuum
Depth class: very shallow to shallow
Drainage class: well
Permeability: moderately rapid
Available water capacity: very low
Effective rooting depth: 10 to 50 cm.
Hazard of erosion:
- by water - moderate to severe
- by wind - very slight

Hydrologic group: D
Slope range: 30 to 60 percent
Runoff: very rapid
Rock fragments: averages 35 to 70 percent in the control section

Pantak
Parent material: slope alluvium and residuum
Depth class: very shallow to shallow
Drainage class: well
Permeability: moderate
Available water capacity: moderate
Effective rooting depth: 10 to 50 cm
Hazard of erosion:
by water - moderate to severe
by wind - very slight
Hydrologic group: D
Runoff: very rapid
Slope range: 10 to 40 percent
Rock fragments: averages 35 to 65 percent in the control section

Rock outcrop
Rock outcrop consists of barren rock that occurs as ledges and nearly vertical cliffs of tilted and folded formations of bedrock. Rock outcrop also includes areas where the soil depth to bedrock is less than 4 inches. The higher percentage of rock outcrop is in areas near the summit and steeper slope areas.

Interpretive Groups

Land capability classification
Lampshire and Pantak - nonirrigated VIIs

Range site
Lampshire and Pantak - Granitic Hills, 12 to 16" p.z.

Vegetation: The plane community on these soils is a diverse mixture of shrub, succulents, grasses and forbs. The main shrubs include ocotillo, prickly pear, sotol, agave, false mesquite, range ratany, spice bush, cholla, rainbow cactus, janusia, trixis, shrubby buckwheat, yerba del venado, brickellia, abutilon, desert hackberry and blue paloverde. The major grasses are sideoats, black, sprucetop, slender, hairy and Santa Rita gramas, tanglehead, bush muhly, Arizona cottontop, plains lovegrass and wolftail. Common forbs are ferns, ragweed, wild carrot, Indian wheat, rose mallow, trailing four o'clock and dalea. These communities have become very shrubby in the absence of fire. One small area that burned in the summer of 1994 has less than half the shrubs of other areas.

LbEv Lampshire tax. - Budlamp tax. - Woodcutter tax. complex, 15 to 60 percent slopes

Setting

Landform: hills and mountains
Slope range: 15 to 60 percent
Hazard of flooding: none
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 57 to 62 degrees F.
Frost-free period: 160 to 210 days

Composition

Lampshire and similar soils: 40 percent
Budlamp and similar soils: 20 percent
Woodcutter and similar soils: 20 percent
Inclusions: 20 percent
(this is an approximate percentage)

Typical Profile

All three soils in this map unit are taxadjuncts. The soil properties of these three soils are outside of the recognized soil series, by one or more differentiating characteristics of the series. These three taxadjunct soils could potentiality be new soil series if a significant area is eventually recognized.

Lampshire
Surface coarse fragments: 35 to 50 percent gravel, cobbles and stones
0 to 8 cm - brown cobbly fine sandy loam
8 to 26 cm - brown gravelly fine sandy loam
26 to 71 cm - brown to reddish brown loam
71 to 100 cm - weathered bedrock
100 cm - unweathered bedrock

Budlamp
Surface coarse fragments: 35 to 55 percent gravel, cobbles and stones
0 to 8 cm - dark yellowish brown cobbly fine sandy loam
8 to 46 cm - dark yellowish brown cobbly loam
46 to 61 cm - yellowish brown extremely cobbly loam
61 to 75 cm - weathered bedrock
75 cm - unweathered bedrock

Woodcutter
Surface coarse fragments: 35 to 45 percent gravel, cobbles and stones
0 to 10 cm - dark brown very gravelly fine sandy loam
10 to 40 cm - brown to reddish brown very gravelly sandy clay loam
40 to 64 cm - brown extremely gravelly fine sandy loam
64 to 71 cm - weathered bedrock
71 cm - unweathered bedrock

Inclusions

Contrasting inclusions
- soils that are deep to bedrock
- soils that are shallow to bedrock
- Chiricahua soils that have over 35 percent clay
- rock outcrop

Soil Properties and Qualities

Lampshire
Parent material: slope alluvium, colluvium and residuum
Depth class: moderately deep
Drainage class: well
Permeability: moderate
Available water capacity: very low to low
Effective rooting depth: 50 to 100 cm
Hazard of erosion:
by water - moderate
by wind - very slight
Hydrologic group: D
Slope range: 25 to 60 percent
Runoff: very rapid
Rock fragments: averages less than 35 percent in the control section

Budlamp
Parent material: slope alluvium and residuum, predominately on north slopes
Depth class: moderately deep
Drainage class: well
Permeability: moderately rapid
Available water capacity: low
Effective rooting depth: 50 to 100 cm
Hazard of erosion:
by water - moderate
by wind - very slight
Hydrologic group: D
Runoff: very rapid
Slope range: 25 to 60 percent
Rock fragments: averages 35 to 70 percent in the control section

Woodcutter
Parent material: slope alluvium and residuum
Depth class: moderately deep
Drainage class: well
Permeability: moderately slow
Available water capacity: low
Hazard of erosion:
by water - moderate
by wind - slight
Hydrologic group: D
Runoff: medium to very rapid
Slope range: 10 to 40 percent

Rock fragments: averages 35 to 70 percent in the control section

Interpretive Groups

Land capability classification
Lampshire, Budlamp and Woodcutter - nonirrigated VIs

Range site
Lampshire, Budlamp and Woodcutter - Shallow Hills, 16 to 20" p.z.

Vegetation: On warm exposures the plant community resembles that of the lower precipitation (12 to 16" p.z.) area with much higher densities of shrubs and cacti. These areas are dominated by dense stands of ocotillo, prickly pear and sotol with small amounts of agave, mesquite, spice bush, hopseed bush and kidneywood. The subdominants include shrubby buckwheat, false mesquite, mimosa, sideoats, hairy and slender gramas, plains lovegrass, tanglehead, green sprangletop and beggertick threeawn.

On cooler exposures and at higher elevations the plant communities is a Savannah with an overstay of Mexican blue oak, Emery oak and alligator juniper. Common understudy shrubs include stool, agape, prickly pear, mimosa, kidneywood, coral bean, silktassle, beargrass, Schott yucca, amole, jacobina, turpentinebush, spicebush, shrubby buckwheat, goldeneye and California bricklbush. The main grasses are bullgrass, Texas bluestem, sideoats grama, beggertick threeawn, plains lovegrass, cane beardgrass, squirriltail, green sprangletop and crinkleawn. Common forbs include herbaceous sage, ferns, club moss, stolon daisy, annual goldeneye, Arizona blue curls, bouvardia and annual morninglory.

At the highest elevations the tree canopy exceeds 20 percent and the community becomes a woodland.

MrE Mabray - Rock outcrop complex, 10 to 60 percent slopes

Setting

Landform: hills
Slope range: 10 to 60 percent
Hazard of flooding: none
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F.
Frost-free period: 180 to 230 days

Composition

Mabray and similar soils: 60 percent
Rock outcrop: 30 percent
Inclusions: 10 percent
(this is an approximate percentage)

Typical Profile

Mabray
Surface coarse fragments: 45 to 55 percent gravel and cobbles
0 to 31 cm - dark grayish brown very gravelly and cobbly loam (calcareous)
31 cm - unweathered bedrock

Inclusions

Contrasting inclusions
- Tombstone soils that very deep
- soils that are moderately deep to bedrock
- Chiricahua soils that have over 35 percent clay

Soil Properties and Qualities

Mabray
Parent material: slope alluvium, colluvium and residuum
Depth class: very shallow to shallow
Drainage class: well
Permeability: moderate
Available water capacity: very low
Hazard of erosion:
- by water - moderate to severe
- by wind - very slight

Hydrologic group: D
Slope range: 10 to 60 percent
Runoff: very rapid
Rock fragments: averages 35 to 75 percent in the control section

Rock outcrop
Rock outcrop consists of barren rock that occurs as ledges and nearly vertical cliffs of tilted and folded formations of bedrock. Rock outcrop also includes areas where the soil depth to bedrock is less than

4 inches. The higher percentage of rock outcrop is in areas near the summit and steeper slope areas.

Interpretive Groups

Land capability classification

Mabray - nonirrigated VIIe

Range site

Mabray - Limestone Hills, 12 to 16" p.z.

Vegetation: The plant community on this soil is a diverse mixture of shrubs, succulents, grasses and forbs. The shrub component includes sotol, ocotillo, mariola, spicebush, sandpaper bush, false mesquite, false indigo bush, wavyleaf, oak, Arizona rosewood, amole, snakeweed, catclaw, Mearns sumac, blue paloverde and mesquite. Important grasses include sideoats, slender and black gramas, rough, slim and shortleaf tridens, tanglehead, bullgrass, bush muhly, blue threeawn, Halls panic, sand dropseed and stipa. Common forbs are fern, dutchmans britches, dyssodia, bahia, croton, milkwort, dalea, bladderpod, rock cress and club moss. The plant community has become very shrubby in the absence of fire.

NsE Nahda - Rillino complex, 1 to 30 percent slopes

Setting

Landform: fan terrace
Slope range: 1 to 30 percent
Hazard of flooding: none
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 66 to 70 degrees F.
Frost-free period: 210 to 240 days

Composition

Nahda and similar soils: 45 percent
Rillino and similar soils: 35 percent
Inclusions: 20 percent
(this is an approximate percentage)

Typical Profile

Nahda
Surface coarse fragments: 45 to 55 percent gravel and cobbles
0 to 8 cm - reddish brown gravelly sandy loam
8 to 23 cm - dark reddish brown gravelly sandy clay
23 to 61 cm - reddish brown very gravelly clay
61 to 86 cm - light reddish brown very gravelly sandy loam
86 to 100 cm - indurated calcium carbonate hardpan

Rillino
Surface coarse fragments: 45 to 50 percent gravel and cobbles
0 to 10 cm - pinkish gray gravelly sandy loam
10 to 115 cm - brown gravelly sandy loam
115 to 150 cm - light brown very gravelly sandy loam

Inclusions

Contrasting inclusions:
- Arizo soils that are in drainageways
- Cave soils that are shallow to hardpan
- slopes greater than 30 percent
- soils that are shallow to moderately deep to bedrock
- soils that have fine textures with less than 35 percent coarse fragments

Soil Properties and Qualities

Nahda
Parent material: mixed
Depth class: moderately deep
Drainage class: well
Permeability: slow
Available water capacity: low to moderate
Potential rooting depth: 50 to 100 cm

Hazard of erosion:
by water - slight
by wind - very slight
Hydrologic group: C
Slope range: 1 to 15 percent
Runoff: slow to medium
Rock fragments: averages greater than 35 in the control section

Rillino
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: moderate
Available water capacity: low
Hazard of erosion:
by water - slight
by wind - moderate
Hydrologic group: B
Runoff: medium
Slope range: 10 to 30 percent
Rock fragments: averages 15 to 40 percent in the control section

Interpretive Groups

Land capability classification:
Nahda and Rillino - nonirrigated VIIe

Range site:
Nahda - Loamy Upland, 10 to 13" p.z.
Rillino - Limy Slopes, 10 to 13" p.z.

Vegetation:
Nahda - The plant community on this soil is dominated by mesquite, whitethorn acacia, snakeweed, and cacti. The main plants in the herbaceous layer are bush muhly, purple threeawn, red grama, slender janusia, desert zinnia, slim tridens, and yerba del vendado.

Rillino - The plant community on the soil is dominated by whitethorn acacia, creosotebush, mariola, ocotillo and cacti. Other important species include bush muhly, blue threeawn, slim tridens, desert zinnia, Texas dogwood, dutchmans britches, bahia, croton, desert holly and fluffgrass.

OvA Oversight fine sandy loam complex, 1 to 3 percent slopes

Setting

Landform: inset fan, stream terraces
Slope range: 1 to 3 percent
Hazard of flooding: none to rare
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 57 to 62 degrees F.
Frost-free period: 160 to 210 days

Composition

Oversight and similar soils: 75 percent
Inclusions: 25 percent
(this is an approximate percentage)

Typical Profile

Oversight
Surface coarse fragments: 5 to 35 percent gravel and cobbles
Some areas have a surface leaf litter
0 to 10 cm - brown fine sandy loam
10 to 38 cm - brown cobbly fine sandy loam
38 to 130 cm - brown very cobbly sandy loam

Inclusions

Contrasting inclusions
- riverwash
- soils that are shallow to bedrock
- soils that have less than 15 percent coarse fragments
- soils that that are light in color
- soils that have very cobbly loamy sand textures

Soil Properties and Qualities

Oversight
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: rapid
Available water capacity: low
Hazard of erosion:
- by water - slight
- by wind - slight

Hydrologic group: B
Slope range: 1 to 3 percent
Runoff: slow
Rock fragments: averages more than 35 percent gravel and/or cobbles in the control section

Interpretive Groups

Land capability classification:
Oversight - nonirrigated VIs

Woodland site:
Oversight - Sandy Bottom,(QUEM, QUAR) 16 to 20" p.z.

Vegetation: This is a woodland site. The plant community is dominated by trees like Arizona white oak, Emory oak, Mexican Blue oak, netleaf hackberry, mesquite, Arizona ash, Arizona black walnut and an occasional Arizona sycamore. Common understory grasses are sideoats grama, plains lovegrass, green spangletop, deergrass, squirreltail, cane beardgrass, and beggartick threeawn. Important forbs include herbaceous sage, ragweed, morninglory, wishbone plant, thistle and cudweed. Some common vines include Mexican passion flower, clematis, canyon grape, cissus and climbing milkweed.

PsC Pinalino - Stagecoach complex, 3 to 15 percent slopes

Setting

Landform: fan terrace
Slope range: 3 to 15 percent
Hazard of flooding: none
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 66 to 70 degrees F.
Frost-free period: 210 to 240 days

Composition

Pinalino and similar soils: 45 percent
Stagecoach and similar soils: 40 percent
Inclusions: 15 percent
(this is an approximate percentage)

Typical Profile

Pinalino
Surface coarse fragments: 45 to 55 percent gravel and cobbles
0 to 5 cm - brown gravelly sandy loam
5 to 76 cm - reddish brown extremely cobbly sandy clay loam
76 to 150 cm - pink extremely gravelly sandy clay loam (calcareous)

Stagecoach
Surface coarse fragments: 35 to 45 percent gravel and cobbles
0 to 10 cm - light brown gravelly sandy loam
10 to 25 cm - light brown very gravelly sandy loam
25 to 150 cm - pinkish gray to light brown very gravelly loam to very gravelly loamy sand (calcareous)

Inclusions

Contrasting inclusions:
- Sandy soils that are in drainageways
- soils that are shallow to hardpan
- slopes greater than 15 percent
- Bucklebar and Hayhook soils that have less than 35 percent coarse fragments
- soils that are in the fine or clayey-skeletal textural family class

Soil Properties and Qualities

Pinalino
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: moderately slow
Available water capacity: low to moderate
Hazard of erosion:

by water - slight
by wind - very slight
Hydrologic group: B
Slope range: 3 to 10 percent
Runoff: medium
Rock fragments: averages greater than 35 percent in the control section

Stagecoach
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: moderate
Available water capacity: low
Hazard of erosion:
by water - slight
by wind - very slight
Hydrologic group: B
Runoff: medium
Slope range: 3 to 15 percent
Rock fragments: averages 35 to 75 percent in the control section

Interpretive Groups

Land capability classification:
Pinalino and Stagecoach - nonirrigated VIIc

Range site:
Pinalino - Loamy Upland, 10 to 13" p.z.
Stagecoach - Limy slopes, 10 to 13" p.z.

Vegetation:
Pinalino - The plant community on this soil is dominated by mesquite, whitethorn acacia, ocotillo, snakeweed, and burroweed. Other common shrubs include slender janusia, range ratany, false mesquite, desert zinnia, and yerba del venado. Jumping and staghorn cholla can be heavy on this soil. The main grasses are bush muhly, purple threeawn, Arizona cottontop, mesa threeawn, and Rothrock grama.

Stagecoach - The plant community on this soil is dominated by whitethorn, ocotillo, cholla species and creosote bush. Bush muhly, fluffgrass, slim tridens, and blue threeawn are the main grasses. Common forbs include bahia, croton, twinleaf senna, ragweed, and annuals. Desert zinnia and twinberry are common half shrubs. The endangered Pima pineapple cactus occurs on this mapping unit.

SbC Sasabe - Baboquivari complex, 1 to 8 percent slopes

Setting

Landform: fan terrace
Slope range: 1 to 8 percent
Hazard of flooding: none
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F.
Frost-free period: 180 to 230 days

Composition

Sasabe and similar soils: 55
Baboquivari and similar soils: 35 percent
Inclusions: 10 percent
(this is an approximate percentage)

Typical Profile

Sasabe
Surface coarse fragments: 0 to 10 percent gravel
0 to 13 cm - brown sandy loam to loamy sand
13 to 80 cm - dusky red clay
80 to 112 cm - dusky red sandy clay
112 to 150 cm - dusky red sandy clay loam

Sasabe (thin surface)
Surface coarse fragments: 5 to 15 percent gravel
0 to 5 cm - brown sandy loam
5 to 80 - dusky clay
80 to 112 - dusky sandy clay
112 to 150 - dusky red sandy clay loam

Baboquivari
Surface coarse fragments: 0 to 10 percent gravel
0 to 20 cm - brown coarse sandy loam
20 to 81 cm - dark brown gravely sandy clay loam
81 to 150 cm - brown sandy clay loam

Inclusions

Contrasting inclusions:
- Combate soils that are in drainageways
- Caralampi and Eloma soils that have more than 35 percent rock fragments
- Diaspar soils that have less than 20 percent clay
- slopes greater than 8 percent

Soil Properties and Qualities

Sasabe
Parent material: mixed

Depth class: very deep
Drainage class: well
Permeability: moderately slow
Available water capacity: high
Hazard of erosion:
by water - slight to moderate
by wind - moderately high
Hydrologic group: B
Slope range: 1 to 8 percent
Runoff: slow to medium
Rock fragments: averages less than 35 percent in the control section

Baboquivari
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: moderately slow
Available water capacity: moderate
Hazard of erosion:
by water - slight
by wind - moderately high
Hydrologic group: B
Runoff: slow
Slope range: 1 to 5 percent
Rock fragments: averages less than 35 percent in the control section

Interpretive Groups

Land capability classification:
Sasabe and Baboquivari - nonirrigated VIc

Range site:
Sasabe and Baboquivari - Sandy Loam Upland, 12 to 16" p.z.
Sasabe (thin surface) - Loamy Upland, 12 to 16" p.z.

Vegetation:
Sasabe and Baboquivari - The plant community on these soils is dominated by mesquite and Lehmann lovegrass. Native grasses and low shrubs occur in minor amounts and include Arizona cottontop, Rothrock and slender gramas, threeawn, plains bristlegrass, burroweed, snakeweed, and shrubby buckwheat.

Sasabe (thin surface) - The plant community on this soil is dominated by mesquite, cacti, burroweed, snakeweed, and false mesquite. In about half the area of this soil the herbaceous layer is dominated by Lehmann lovegrass. On the other half, native plants dominate like black, Rothrock, sprucetop, slender and sideoats gramas, red and purple threeawn, tanglehead, Arizona cottontop, bush muhly, range ratany, ameda, carlowrightii, senna, desert zinnia, curley mesquite and ragweed. The endangered Pima pineapple cactus occurs on this mapping unit.

ToB Tombstone complex, 0 to 5 percent slopes

Setting

Landform: fan terrace
Slope range: 0 to 5 percent
Hazard of flooding: none
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F.
Frost-free period: 180 to 230 days

Composition

Tombstone gravelly sandy loam and similar soils: 55 percent
Tombstone sandy loam and similar soils: 30 percent
Inclusions: 15 percent
(this is an approximate percentage)

Typical Profile

Tombstone gravelly sandy loam
Surface coarse fragments: 35 to 45 percent gravel and cobbles
0 to 23 cm - brown gravelly sandy loam (calcareous)
23 to 74 cm - brown very gravelly sandy loam (calcareous)
74 to 150 cm - brown very gravelly loamy sand (calcareous)

Tombstone sandy loam
Surface coarse fragments: 5 to 15 percent gravel
0 to 13 cm - brown sandy loam
13 to 23 - brown gravelly sandy loam (calcareous)
23 to 74 - brown very gravelly sandy loam (calcareous)
74 to 150 - brown very gravelly loamy sand (calcareous)

Inclusions

Contrasting inclusions:
- Bodecker soils that are in drainageways
- soils that have less than 15 percent coarse fragments
- Cave and Nahda soils that are shallow to moderately deep to a cemented hardpan
- slopes greater than 5 percent

Soil Properties and Qualities

Tombstone
Parent material: mixed
Depth class: very deep
Drainage class: moderately rapid
Permeability: moderately rapid
Available water capacity: low
Hazard of erosion:
- by water - slight
- by wind - slight to moderate

Hydrologic group: B
Slope range: 0 to 5 percent
Runoff: slow
Rock fragments: averages greater than 35 percent in the control section

Interpretive Groups

Land capability classification:
Tombstone - nonirrigated VIc

Range site:
Tombstone - Limy Fan, 12 to 16" p.z. (The range site description for Limy Fan 12 to 16" p.z. has not yet been developed.)

Vegetation:
The plant community on this soil is dominated by creosote bush, mesquite, desert zinnia, and bush muhly. Other important grasses are black and sideoats grama, Pima pappusgrass, blue threeawn, fluffgrass and sand dropseed. Important fobs are desert holly, bahia, croton, and ragweed. Common shrubs included Mormon tea, prickly pear, cholla, fourwing saltbush, greythorn and wolfberry. In some places Lehmann lovegrass is common in the herbaceous layer. The endangered Pima pineapple cactus occurs on this soil.

TsC Topawa complex, 1 to 8 percent slopes

Setting

Landform: fan terrace
Slope range: 1 to 8 percent
Hazard of flooding: none
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 66 to 70 degrees F.
Frost-free period: 210 to 240 days

Composition

Topawa and similar soils: 75 percent
Inclusions: 25 percent
(this is an approximate percentage)

Typical Profile

Topawa (thick surface)
Surface coarse fragments: 5 to 20 percent gravel
0 to 15 cm - brown coarse sandy loam
15 to 26 cm - reddish brown gravelly sandy loam
26 to 61 cm - reddish brown very gravelly sandy clay loam
61 to 150 cm - reddish brown very gravelly sandy clay

Topawa (thin surface)
Surface coarse fragments: 5 to 20 percent gravel
0 to 10 cm - reddish brown coarse sandy loam
10 to 61 cm - reddish brown very gravelly sandy clay loam
61 to 150 cm - reddish brown very gravelly sandy clay

Inclusions

Contrasting inclusions:
- Arizo soils that are in drainageways
- soils that have more than 35 percent clay
- Hayhook and Pajarito soils that have less than 20 percent clay
- Bucklebar soils that have less than 35 percent coarse fragments
- Pinalino and Stagecoach soils that are calcareous
- slopes greater than 8 percent

Soil Properties and Qualities

Topawa
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: moderately slow
Available water capacity: low

Hazard of erosion:
by water - slight to moderate
by wind - very slight
Hydrologic group: B
Slope range: 1 to 8 percent
Runoff: slow to medium
Rock fragments: averages greater than 35 percent in the control section

Interpretive Groups

Land capability classification:
Topawa - nonirrigated VIIc

Range site:
Topawa (thick surface) - Sandy Loam Upland, 10 to 13" p.z.
Topawa (thin surface) - Loamy Upland, 10 to 13" p.z.

Vegetation:
Topowa (thick surface) - The plant community on this soil is dominated by mesquite, cacti, Lehmann lovegrass and burroweed. Native grasses occur in minor amounts and include bush muhly, Arizona cottontop, Rothrock grama, spidergrass, and Mesa threeawn. Other shrubs like desert zinnia, shortleaf baccharis, and Mormon tea can be present.

Topowa (thin surface)-The plant community on this soil is dominated by mesquite, ocotillo, cacti and native half-shrubs, grasses and forbs. The main grasses include bush muhly, spidergrass, purple threeawn, Arizona cottontop, fluffgrass, and red and black grama. Common low shrubs include false mesquite, ratany, janusia, desert zinnia and shrubby buckwheat. Forbs are yerba del venado, ragweed, croton, spiny goldenhead and ground cherry. Lehmann lovegrass occurs on this soil but does not dominate anywhere. The endangered Pima pineapple cactus occurs on this mapping unit.

TuA Tubac complex, 0 to 2 percent slopes

Setting

Landform: basin floor
Slope range: 0 to 2 percent
Hazard of flooding: none to rare
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 66 to 70 degrees F.
Frost-free period: 210 to 240 days

Composition

Tubac silt loam and similar soils: 40 percent
Tubac sandy loam and similar soils: 30 percent
Inclusions: 20 percent
(this is an approximate percentage)

Typical Profile

Tubac silt loam
Surface coarse fragments: 0 to 10 percent gravel
0 to 5 cm - brown silt loam
85 to 58 cm - brown clay
58 to 104 cm - reddish brown sandy clay
104 to 150 cm - reddish brown sandy clay loam

Tubac sandy loam
Surface coarse fragments: 5 to 15 percent gravel
0 to 10 cm - brown sandy loam
10 to 58 cm - brown clay
58 to 104 cm - reddish brown sandy clay
104 to 150 cm - reddish brown sandy clay loam

Inclusions

Contrasting inclusions:
- Sandy soils that are in drainageways
- Hayhook soils that have less than 18 percent clay
- Bucklebar soils that have less than 35 percent clay
- slopes greater than 2 percent
- sandy loam surfaces greater than 10 cm thick

Soil Properties and Qualities

Tubac silt loam
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: slow
Available water capacity: high

Hazard of erosion:
by water - moderate
by wind - moderately high
Hydrologic group: C
Slope range: 0 to 1 percent
Runoff: slow
Rock fragments: averages 0 to 15 percent in the control section

Tubac sandy loam
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: slow
Available water capacity: moderate
Hazard of erosion:
by water - moderate
by wind - moderately high
Hydrologic group: C
Runoff: slow to medium
Slope range: 0 to 2 percent
Rock fragments: 0 to 15 percent

Interpretive Groups

Land capability classification:
Tubac - nonirrigated VIIe

Range site:
Tubac silt loam - Clayloam Upland, 10 to 13" p.z.
Tubac sandy loam - Loamy Upland, 10 to 13" p.z.

Vegetation:
Tubac silt loam - This soil is nearly devoid of vegetation. Its potential includes a herbaceous layer dominated by tobosa grass and purple threeawn with shrubs and succulents like prickly pear, cholla species, mesquite and fourwing saltbush.

Tubac sandy loam - The plant community on this soil is dominated by mesquite, burroweed and cacti. Common grasses in the herbaceous layer include bush muhly, purple threeawn, spider-grass, Mesa threeawn, Pima pappusgrass and some Lehmann lovegrass and Boer lovegrass. Other common shrubs are wolfberry, Mormon tea, desert hackberry, fourwing saltbush and desert zinnia. The endangered Pima pineapple cactus occurs on this mapping unit.

WeC White House - Eloma complex, 1 to 10 percent slopes

Setting

Landform: fan terrace
Slope range: 1 to 10 percent
Hazard of flooding: none
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 60 to 67 degrees F.
Frost-free period: 180 to 230 days

Composition

White House and similar soils: 45
Eloma and similar soils: 35 percent
Inclusions: 20 percent
(this is an approximate percentage)

Typical Profile

White House
Surface coarse fragments: 5 to 15 percent gravel and cobbles
0 to 5 cm - brown sandy loam
5 to 8 cm - brown clay loam
8 to 92 cm - dark reddish brown and red clay
92 to 150 cm - yellowish red sandy clay loam

Eloma
Surface coarse fragments: 5 to 15 percent gravel and cobbles
0 to 5 cm - brown sandy loam
5 to 68 - dark reddish brown very gravelly clay
68 to 150 - dark reddish brown extremely cobbly clay

Inclusions

Contrasting inclusions:
- Keysto soils that are in drainageways
- Caralampi soils that have less than 35 percent clay
- Combate and Diaspar soils that have less than 20 percent clay
- soils that are moderately deep to deep to bedrock
- side slopes greater than 10 percent

Soil Properties and Qualities

White House
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: slow
Available water capacity: moderate
Hazard of erosion:
by water - slight
by wind - moderately high

Hydrologic group: C
Slope range: 1 to 10 percent
Runoff: slow to medium
Rock fragments: averages less than 35 percent in the control section

Eloma
Parent material: mixed
Depth class: very deep
Drainage class: well
Permeability: slow
Available water capacity: low
Hazard of erosion:
by water - slight
by wind - very slight
Hydrologic group: C
Runoff: slow to medium
Slope range: 1 to 10 percent
Rock fragments: averages than 35 percent in the control section

Interpretive Groups

Land capability classification:
White House and Eloma - nonirrigated VIs

Range site:
White House and Eloma - Loamy Upland, 12 to 16" p.z.

Vegetation:
The plant community on these soils is dominated by false mesquite and Lehmann lovegrass. Scattered ocotillo and mesquite occur on these soils. Native grasses, forbs and shrubs occur in minor amounts. The grasses are black, sprucetop, slender, hairy and sideoats gramas, curley mesquite, spidergrass, tanglehead, Arizona cottontop and cane beardgrass. Forbs include anoda, evolvulous, sicla, spiderling, rock cress, Indian wheat, silverleaf niteshade and ragweed. Other half shrubs are range ratany, desert zinnia, Texas zinnia, agave, and rainbow cactus.

Santa Rita Experimental Range
Classification of The Soils Legend

Typic Aridic; 10 to 12 inch precipitation zone

Agustin	Coarse-loamy, mixed, superactive, thermic Typic Haplocalcids
Arizo	Sandy-skeletal, mixed, thermic Typic Torriorthents
Bucklebar	Fine-loamy, mixed, superactive, thermic Typic Haplargids
Cave	Loamy, mixed, superactive, thermic, shallow Typic Petrocalcids
Hayhook	Coarse- loamy, mixed, superactive, thermic Typic Haplocambids
Nahda	Clayey-skeletal, mixed, superactive, thermic Typic Petroargids
Pajarito	Coarse-loamy, mixed, superactive, thermic Typic Haplocambids
Pinalino	Loamy-skeletal, mixed, superactive, thermic Typic Calciargids
Rillino	Coarse-loamy, mixed, superactive, thermic Typic Haplocalcid
Stagecoach	Loamy-skeletal, mixed, superactive, thermic Typic Haplocalcids
Topawa	Loamy-skeletal, mixed, superactive, thermic Typic Haplargids
Tubac	Fine, mixed, superactive, thermic, Typic Paleargids

Ustic Aridic; 12 to 16 inch precipitation zone

Baboquivari	Fine-loamy, mixed, superactive, thermic Ustic Haplargids
Bodecker	Sandy-skeletal, mixed, thermic, Ustic Torriorthents
Caralampi	Loamy-skeletal, mixed, superactive, thermic Ustic Haplargids
Chiricahua	Clayey, mixed, superactive, thermic, shallow Ustic Haplargids
Combate	Coarse-loamy, mixed, superactive, nonacid, thermic Ustic Torrifluvents
Diaspar	Coarse-loamy, mixed, superactive, thermic Ustic Haplarigds
Eloma	Clayey-skeletal, mixed, superactive, thermic Ustic Haplargids
Keysto	Loamy-skeletal, mixed, superactive, nonacid, thermic Ustic Torriorthents
Lampshire	Loamy-skeletal, mixed, superactive, nonacid, thermic Lithic Ustic Torriorthents
Mabray	Loamy-skeletal, carbonatic, thermic Lithic Ustic Torriorthents
Pantak	Loamy-skeletal, mixed, superactive, thermic Lithic Ustic Haplargids
Sasabe	Fine, mixed, superactive, thermic Ustic Paleargids
Tombstone	Loamy-skeletal, mixed, superactive, thermic Ustic Haplocalcids
White House	Fine, mixed, superactive, thermic Ustic Haplargids

Aridic Ustic; 16 to 20 inch precipitation zone

Budlamp	Loamy-skeletal, mixed, superactive, thermic Lithic Haplustolls
Budlamp tax.*	Loamy-skeletal, mixed, superactive, thermic Aridic Haplustolls
Lampshire tax.*	Coarse-loamy, mixed, superactive, thermic Aridic Ustochrepts
Oversight	Loamy-skeletal, mixed, superactive, thermic Aridic Ustochrepts
Woodcutter	Loamy-skeletal, mixed, superactive, thermic Lithic Argiustolls
Woodcutter tax.*	Loamy-skeletal, mixed, superactive, thermic Aridic Argiustoll

*All three soils in this map unit are taxadjuncts. The soil properties of these three soils are outside of the recognized soil series, by one or more differentiating characteristics of the series. These three taxadjunct soils could potentiality be new soil series if a significant area is eventually recognized.

Agustin Series

Depth class: very deep
Drainage class: well
Permeability: moderately rapid
Landform: fan terrace
Parent material: mixed
Slope range: 0 to 3 percent

Classification: Coarse-loamy, mixed, superactive, thermic Typic Haplocalcids

Typical Pedon

Representative profile of Agustin sandy loam, in an area of Agustin sandy loam, 0 to 3 percent slopes, located at a latitude of 32 degrees, 54 minutes, 40 seconds North and longitude of 110 degrees, 51 minutes, 12 seconds West.

5 to 15 percent of the surface is covered with gravel

A--0 to 5 cm.; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist, weak thin platy structure; loose, nonsticky and nonplastic; common fine roots; common fine irregular and fine tubular pores; noneffervescent; slightly alkaline; abrupt smooth boundary.

Bw--5 to 14 cm.; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 3/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few fine tubular pores; noneffervescent to very slightly effervescent; slightly alkaline; clear smooth boundary.

Bk1--14 to 42 cm.; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots; few fine tubular pores; strongly effervescent; common fine calcium carbonate filaments; moderately alkaline; clear wavy boundary.

Bk2--42 to 84 cm.; brown (10YR 5/3) sandy loam, yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; few fine tubular pores; strongly effervescent; few fine calcium carbonate filaments; moderately alkaline; clear wavy boundary.

2Bk1--84 to 121 cm.; pale brown (10YR 6/3) gravelly coarse sandy loam, dark yellowish brown (10YR 4/4) moist; massive; looses, nonsticky and nonplastic; few fine roots; common fine irregular pores; thin continuous distinct calcium carbonate filaments on undersides of gravel; 15 to 20 percent gravel; strongly effervescent; moderately alkaline; abrupt wavy boundary.

3Bk2--121 to 170 cm.; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; few fine tubular pores; strongly effervescent; common fine calcium carbonate filaments; moderately alkaline.

Range of Characteristics

Rock fragments: averages less than 15 percent in the control section
Reaction: slightly alkaline to moderately alkaline
Effervescence: slightly to violently effervescent
Clay content: less than 18 percent
Organic matter: less than 0.5 percent

A horizon
- Hue: 10YR
- Value: 4 or 5, dry or moist
- Chroma: 4, dry or moist
- Texture: sandy loam

Bw and Bk horizons
- Hue: 10YR, 7.5YR
- Value: 5 or 6 dry, 4 or 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: fine sandy loam, sandy loam, gravely coarse sandy loam

Arizo Series

Depth class: very deep
Drainage class: excessively drained
Permeability: rapid
Landform: flood plains, drainageways, inset fans
Parent material: mixed
Slope range: 0 to 3 percent

Classification: Sandy-skeletal, mixed, thermic Typic Torriorthents

Typical Pedon

The Arizo series used in this soil resource inventory has the same soil range in characteristics used in soil surveys from the surrounding area. The typical pedon description for the Arizo series is from the Tohono O'odham Nation soil survey and the Eastern Pima soil survey. Representative profile of Arizo gravelly loamy sand is in the area of Arizo-Riverwash complex, 0 to 3 percent slopes from the Tohono O'odham soil survey area at a latitude of 32 degrees, 26 minutes, 35 seconds North and a longitude of 112 degrees, 6 minutes, 20 seconds West.

5 to 15 percent of the surface is covered with gravel and cobbles

A--0 to 3 cm.; yellowish brown (10YR 5/6) gravelly loamy sand, dark yellowish brown (10YR 4/4) moist, weak thin platy; loose, nonsticky and nonplastic; few fine roots; few fine vesicular pores; 20 percent gravel; noneffervescent; mildly alkaline; clear wavy boundary.

A/C--3 to 46 cm.; yellowish brown (10YR 5/4) gravelly loamy sand, dark yellowish brown (10YR 4/4) moist, single grain; loose, nonsticky and nonplastic; few fine roots; common fine interstitial pores; 20 percent gravel; noneffervescent; mildly alkaline; clear wavy boundary.

C1--46 to 84 cm.; light yellowish brown (10YR 6/4) very gravelly loamy sand, yellowish brown (10YR 5/4) moist, single grain; loose, nonsticky and nonplastic; few fine roots; common fine interstitial pores; 35 percent gravel; slightly effervescent; mildly alkaline; clear wavy boundary.

C2--84 to 132 cm.; light yellowish brown (10YR 6/4) very gravelly loamy sand, yellowish brown (10YR 5/4) moist, single grain; loose, nonsticky and nonplastic; few fine roots; common fine interstitial pores; 55 percent gravel; strongly effervescent; mildly alkaline; abrupt wavy boundary.

C3--132 to 152 cm.; light yellowish brown (10YR 6/4) very gravelly loamy sand, yellowish brown (10YR 5/4) moist, single grain; loose, nonsticky and nonplastic; few fine roots; common fine interstitial pores; 45 percent gravel; strongly effervescent; moderately alkaline.

Range of Characteristics

Rock fragments: averages 35 to 65 percent in the control section
Reaction: slightly alkaline to moderately alkaline
Effervescence: none to strongly effervescent
Organic matter: less than 0.5 percent

A horizon
  Hue: 10YR, 7.5YR
  Value: 5 or 6 dry, 4 or 5 moist
  Chroma: 3 through 6, dry or moist

C horizons
  Hue: 10YR, 7.5YR
  Value: 5 or 6 dry, 4 or 5 moist
  Chroma: 3 through 5, dry or moist
  Texture: loamy sand, coarse sand

Baboquivari Series

Depth class: very deep
Drainage class: well
Permeability: moderately slow
Landform: fan terrace
Parent material: mixed
Slope range: 1 to 8 percent

Classification: Fine-loamy, mixed, superactive, thermic Ustic Haplargids

Typical Pedon

Representative profile of Baboquivari coarse sandy loam, in area of Baboquivari-Combate complex, 1 to 5 percent slopes, located at a latitude of 31 degrees, 46 minutes, 56 seconds North and longitude of 110 degrees, 50 minutes, 12 seconds West.

5 to 10 percent of the surface is covered with gravel

A1--0 to 8 cm.; dark yellowish brown (10YR 4/4)loamy sand, dark brown (10YR 3/3) moist, single grain; loose, nonsticky and nonplastic; common fine roots; common fine irregular and fine tubular pores; noneffervescent; slightly acid; abrupt smooth boundary.

A2--8 to 20 cm.; brown (10YR 4/3) sandy loam, dark brown (10YR 3/3) moist; single grain; soft, very friable, nonsticky and nonplastic; common fine roots; few fine tubular pores; noneffervescent; slightly acid; clear smooth boundary.

Bt1--20 to 36 cm.; dark brown (7.5YR 3/4) gravelly sandy clay loam, very dark brown (7.5YR 2.5/3) moist; moderate coarse subangular blocky structure; slightly hard, very friable, sticky and plastic; common fine roots; few fine tubular pores; common distinct clay films on ped faces, gravel and lining of pores; 15 to 20 percent gravel; noneffervescent; neutral; clear wavy boundary.

Bt2--36 to 81 cm.; brown (7.5YR 4/4) gravelly sandy clay loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure parting to moderate coarse subangular blocky structure; slightly hard, friable, sticky and plastic; common fine roots; few fine tubular pores; common distinct clay films on ped faces, gravel and lining of pores; 15 to 20 percent gravel; noneffervescent; neutral; clear wavy boundary.

2Bt3--81 to 150 cm.; yellowish red (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate coarse subangular blocky structure; slightly hard, friable, sticky and plastic; few fine roots; few fine tubular pores; common distinct clay films on ped faces and lining of pores; noneffervescent; neutral; clear.

Range of Characteristics

Rock fragments: averages 5 to 35 percent in the control section
Reaction: slightly acid to slightly alkaline
Effervescence: noneffervesecnt to slightly effervescent
Organic matter: 1 to 3 percent in the surface

A horizon
  Hue: 10YR, 7.5YR
  Value: 4 or 5 dry, 2 through 4 moist
  Chroma: 0 through 4, dry or moist
  Texture: loamy sand, sandy loam

Bt horizon
  Hue: 5YR, 7.5YR
  Value: 3 through 6, dry or moist
  Chroma: 2 through 6, dry or moist
  Texture: sandy clay loam, clay loam

C horizon (when present)
  Hue: 5YR, 7.5YR
  Value: 3 through 6, dry or moist
  Chroma: 3 through 6, dry or moist
  Texture: loamy sand, coarse sandy loam

Bodecker Series

Depth class: very deep
Drainage class: excessively drained
Permeability: very rapid
Landform: stream terraces, inset fans
Parent material: mixed
Slope range: 1 to 3 percent

Classification: Sandy-skeletal, mixed, thermic Ustic Torriorthents

Typical Pedon

Representative profile of Bodecker loamy fine sand is in the area of Bodecker-Riverwash complex, 1 to 3 percent slopes at a latitude of 31 degrees, 50 minutes, 23 seconds North and a longitude of 110 degrees, 52 minutes, 12 seconds West.

5 to 25 percent of the surface is covered with gravel and cobbles

C1--0 to 8 cm.; brown (10YR 5/3)loamy fine sand, brown (10YR 4/3) moist, moderate thin platy structure to single grain; loose, nonsticky and nonplastic; few fine roots; common fine irregular pores; noneffervescent; neutral; abrupt wavy boundary.

C2--8 to 35 cm.; brown (10YR 5/3) gravelly sand, brown (10YR 4/3) moist, massive; loose, nonsticky and nonplastic; common fine roots; common fine irregular pores; noneffervescent; neutral; clear wavy boundary.

C3--35 to 81 cm.; brown (10YR 5/3) very gravelly sand, brown (10YR 4/3) moist, massive; loose, nonsticky and nonplastic; common fine and few medium roots; common fine irregular pores; noneffervescent; slightly alkaline; clear wavy boundary.

C4--81 to 150 cm.; brown (10YR 6/3) very gravelly coarse sand, brown (10YR 4/3) moist, massive; loose, nonsticky and nonplastic; few fine and medium roots; common fine irregular pores; very slightly effervescent; slightly alkaline.

Range of Characteristics

Rock fragments: averages more than 35 percent in the control section; of gravel, cobble and stones
Reaction: neutral to slightly alkaline
Effervescence: none to slightly effervescent
Organic matter: less than 0.5 percent
Clay content: 3 to 10 percent

C horizons
  Hue: 10YR, 7.5YR
  Value: 4 through 6 dry, 3 through 5 moist
  Chroma: 3 or 4, dry or moist
  Textures: loamy sand, sand, coarse sand

Bucklebar Series

Depth class: very deep
Drainage class: well
Permeability: moderate
Landform: fan terrace
Parent material: mixed
Slope range: 0 to 3 percent

Classification: Fine-loamy, mixed, superactive, thermic Typic Haplargids

Typical Pedon

Representative profile of Bucklebar sandy loam, in area of Hayhook - Bucklebar complex, 0 to 3 percent slopes, located at a latitude of 31 degrees, 49 minutes, 15 seconds North and longitude of 110 degrees, 55 minutes, 02 seconds West.

5 to 15 percent of the surface is covered with gravel

A1--0 to 13 cm.; brown (7.5YR 5/4) sandy loam, brown (7.5YR 4/4) moist, weak medium and thin platy structure; soft, very friable, nonsticky and nonplastic; common fine roots; common fine irregular and fine tubular pores; noneffervescent; neutral; abrupt smooth boundary.

Bw--13 to 38 cm.; brown (7.5YR 4/4) sandy loam, dark brown (7.5YR 3/4) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots; few fine tubular pores; noneffervescent; neutral; clear smooth boundary.

Bt1--38 to 76 cm.; brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few fine roots; few fine tubular pores; common distinct clay films on ped faces and lining of pores; noneffervescent; slightly alkaline; clear wavy boundary.

Bt2--76 to 150 cm.; yellowish red (5YR 4/6) sandy clay loam, dark reddish brown (5YR 3/4) moist; weak coarse prismatic structure parting to moderate coarse subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine roots; few fine tubular pores; common distinct clay films on ped faces and lining of pores; noneffervescent; slightly alkaline.

Range of Characteristics

Rock fragments: averages 0 to 15 percent in the control section
Reaction: neutral to moderately alkaline
Effervescence: noneffervesecnt to strongly effervescent
Organic matter: less than 1 percent in the surface

A and Bw horizons
  Hue: 10YR, 7.5YR
  Value: 4 or 5 dry, 3 through 5 moist
  Chroma: 2 through 4, dry or moist
  Texture: loamy sand, sandy loam

Bt horizon
  Hue: 5YR, 7.5YR
  Value: 4 through 6, dry or moist
  Chroma: 3 through 6, dry or moist
  Texture: sandy clay loam

Budlamp Series

Depth class: very shallow to shallow
Drainage class: well
Permeability: moderately rapid
Landform: hills and mountains
Parent material: slope alluvium, colluvium, residuum
Slope range: 20 to 60 percent

Classification: Loamy-skeletal, mixed, superactive, thermic Lithic Haplustolls

Typical Pedon

The Budlamp series used in this soil resource inventory has the same soil range in characteristics used in soil surveys from the surrounding area. The only characteristics changed in this description is the slope range. This was done to better represent what was observed on the Santa Rita Experimental Range. The typical pedon description for the Budlamp series is from Soil Survey of San Pedro Valley, Arizona an interim report from the Cochise County, Douglas-Tombstone Part soil survey. Representative profile of Budlamp very gravelly sandy loam is in the area of Budlamp-Woodcutter complex, 15 to 60 percent slopes from the Cochise County, Douglas-Tombstone Part soil survey area at a latitude of 32 degrees, 30 minutes, 10 seconds North and a longitude of 110 degrees, 22 minutes, 30 seconds West.

35 to 45 percent of the surface is covered with gravel and cobbles

A--0 to 5 cm.; dark brown (10YR 3/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist, weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common fine irregular pores; 45 percent gravel; noneffervescent; moderately acid; abrupt smooth boundary.

C--5 to 20 cm.; very dark grayish brown (10YR 3/3) extremely gravelly fine sandy loam, black (10YR 2/1) moist, massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common fine irregular and tubular pores; many distinct organic coatings on rock fragments; 60 percent gravel and 15 percent cobbles; noneffervescent; moderately acid; abrupt smooth boundary.

R--20 cm.; unweathered granite.

Range of Characteristics

Depth to bedrock: 13 to 50 cm.
Rock fragments: averages 35 to 70 percent in the control section
Reaction: moderately acid to neutral
Effervescence: noneffervescent
Clay content: 5 to 18 percent
Organic matter: 1 to 3 percent

A and C horizons
Hue: 10YR, 7.5YR
Value: 3 through 5 dry, 2 or 3 moist
Chroma: 1 through 3 dry or moist
Texture: sandy loam, fine sandy loam

Budlamp taxadjunct Series

Depth class: moderately deep
Drainage class: well
Permeability: moderately rapid
Landform: hills and mountains
Parent material: slope alluvium, residuum
Slope range: 25 to 60 percent

Classification: Loamy-skeletal, mixed, superactive, thermic Aridic Haplustolls

Typical Pedon

Representative profile of Budlamp tax. cobbly fine sandy loam, in area of Lampshire tax.-Budlamp tax.-Woodcutter tax. complex, 15 to 60 percent slopes, located at a latitude of 31 degrees, 45 minutes, 33 seconds North and longitude of 110 degrees, 50 minutes, 32 seconds West.

35 to 55 percent of the surface is covered with gravel and cobbles and stones

A1--0 to 8 cm.; dark yellowish brown (10YR 3/4) cobbly fine sandy loam, very dark brown (10YR 2/2) moist, weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common fine irregular pores; noneffervescent; moderately acid; abrupt smooth boundary.

A2--8 to 46 cm.; dark yellowish brown (10YR 3/4) cobbly loam, very dark yellowish brown (10YR 2/2) moist, massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common fine irregular and tubular pores; many distinct organic coatings on rock fragments; noneffervescent; slightly acid; abrupt smooth boundary.

C--46 to 61 cm.; yellowish brown (10YR 5/4) extremely cobbly loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; few fine tubular pores; noneffervescent; slightly acid; abrupt irregular boundary.

Cr--61 to 75 cm. weathered bedrock.

R--75 cm.; unweathered bedrock.

Range of Characteristics

Depth to weathered bedrock: 50 to 90 cm.
Depth to unweathered bedrock: 63 to 100 cm.
Rock fragments: averages 35 to 70 percent in the control section
Reaction: moderately acid to neutral
Effervescence: noneffervescent
Organic matter: 1 to 3 percent

A horizons
Hue: 10YR, 7.5YR
Value: 2 or 3, dry or moist
Chroma: 1 through 4 dry or moist
Texture: sandy loam, fine sandy loam

C horizon
Hue: 10YR, 7.5YR
Value: 4 or 5, dry or moist
Chroma: 3 or 4 dry or moist
Texture: loam, fine sandy loam

The soil properties of this soil are outside of the recognized soil series by one or more differentiating characteristics. This soil is moderately deep to bedrock making it a taxadjunct of the Budlamp series. This taxadjunct soil could potentiality be a new soil series if a significant area is eventually recognized.

Caralampi Series

Depth class: very deep
Drainage class: well
Permeability: moderately slow
Landform: fan terrace
Parent material: mixed
Slope range: 1 to 8 percent

Classification: Loamy-skeletal, mixed, superactive, thermic Ustic Haplargids

Typical Pedon

Representative profile of Caralampi gravelly sandy loam, in area of Caralampi sandy loam, 1 to 8 percent slopes, located at a latitude of 31 degrees, 46 minutes, 29 seconds North and longitude of 110 degrees, 52 minutes, 05 seconds West.

5 to 25 percent of the surface is covered with gravel and cobbles

A1--0 to 5 cm.; brown (7.5YR 5/3)sandy loam, dark brown (7.5YR 3/3) moist, weak thin platy structure; soft, very friable, nonsticky and nonplastic; many fine roots; few fine tubular pores; noneffervescent; slightly acid; abrupt smooth boundary.

A2--5 to 15 cm.; brown (7.5YR 5/3) gravelly sandy loam, dark brown (7.5YR 3/3) moist; single grain; soft, very friable, nonsticky and nonplastic; many fine roots; few fine tubular pores; 25 to 30 percent gravel, noneffervescent; slightly acid; abrupt smooth boundary.

Bt1--15 to 30 cm.; reddish brown (5YR 4/3) gravelly sandy clay loam, very reddish brown (5YR 2.5/3) moist; moderate fine subangular blocky structure; slightly hard, friable, moderately sticky and moderately plastic; many fine roots; common fine tubular pores; common distinct clay films on ped faces and coarse fragments; noneffervescent; slightly acid; abrupt smooth boundary.

Bt2--30 to 51 cm.; reddish brown (5YR 4/4) gravelly cobbly clay loam, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, friable, moderately sticky and moderately plastic; many fine and common medium roots; common fine tubular pores; many distinct clay films on ped faces and coarse fragments; noneffervescent; neutral; clear wavy boundary.

Bt3--51 to 81 cm.; reddish brown (5YR 4/4) extremely cobbly sandy clay loam, reddish brown (5YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, very sticky and very plastic; common fine roots; common fine tubular pores; many distinct clay films on ped faces and coarse fragments and few irregular shaped manganese coats on ped faces and coarse fragments; noneffervescent; neutral; clear.

2Bt4--81 to 150 cm. reddish brown (5YR 4/4) extremely cobbly sandy clay, reddish brown (5YR 4/3) moist; moderate fine subangular blocky structure; hard, firm, very sticky and very plastic; few fine roots; few fine tubular pores; many distinct clay films on ped faces and coarse fragments and few irregular shaped manganese coats on ped faces and coarse fragments; noneffervescent; neutral.

Range of Characteristics

Rock fragments: averages 35 to 80 percent in the control section
Reaction: slightly acid to neutral
Effervescence: noneffervesecnt
Clay: averages less than 35 percent in the control section
Organic matter: 1 to 3 percent in the surface

A horizon
- Hue: 7.5YR, 5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 2 through 4, dry or moist
- Texture: sandy loam

Bt horizon
- Hue: 5YR
- Value: 3 through 5, dry or moist
- Chroma: 2 through 6, dry or moist
- Texture: clay loam, sandy clay loam, sandy clay

Cave Series

Depth class: very shallow and shallow
Drainage class: well
Permeability: moderate
Landform: fan terrace
Parent material: mixed
Slope range: 1 to 5 percent

Classification: Loamy, mixed, superactive, thermic Typic Petrocalcids

Typical Pedon

Representative profile of Cave sandy loam, in an area of Cave-Rillino - Nahda complex, 1 to 10 percent slopes, located at a latitude of 31 degrees, 54 minutes, 02 seconds North and longitude of 110 degrees, 48 minutes, 39 seconds West.

30 to 40 percent of the surface is covered with gravel and cobbles

A--0 to 3 cm.; brown (7.5YR 5/3) sandy loam, dark brown (7.5YR 3/3) moist, weak thin platy structure; soft, very friable, nonsticky and nonplastic; few fine roots; few fine tubular pores; violently effervescent; moderately alkaline; abrupt smooth boundary.

Bk--3 to 13 cm.; brown (7.5YR 5/4) gravelly sandy loam, brown (7.5YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine roots; few fine tubular pores; violently effervescent; moderately alkaline; abrupt smooth boundary.

2Bkm--13 to 20 cm.; indurated calcium carbonate cemented hardpan.

Range of Characteristics

Rock fragments: averages less than 35 percent in the control section
Reaction: moderately alkaline
Effervescence: strongly to violently effervescent
Depth to hardpan: 10 to 50 cm.

A horizon
- Hue: 10YR, 7.5YR
- Value: 5 through 7 dry, 3 through 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam

Bk horizon
- Hue: 10YR, 7.5YR
- Value: 5 through 7 dry, 4 or 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam, loam

Chiricahua Series

Depth class: shallow
Drainage class: well
Permeability: slow
Landform: hills
Parent material: slope alluvium, residuum
Slope range: 3 to 18 percent

Classification: Clayey, mixed, superactive, thermic, shallow Ustic Haplargids

Typical Pedon

The Chiricahua series used in this soil resource inventory has the same soil range in characteristics used in soil surveys from the surrounding area. The only characteristics changed in this description is the slope range. This was done to better represent what was observed on the Santa Rita Experimental Range. The typical pedon description for the Chiricahua series is from Santa Cruz and Parts of Cochise and Pima Counties, Arizona soil survey. Representative profile of Chiricahua cobbly sandy loam, in an area of Chiricahua cobbly sandy loam, 10 to 45 percent slopes, located about the northeast corner of the northwest quarter of the southwest quarter of section 8, T.21S., R.14E., Santa Cruz County.

10 to 35 percent of the surface is covered with gravel, cobbles and stones

A1--0 to 8 cm.; dark brown (7.5YR 4/2) cobbly sandy loam, dark brown (7.5YR 3/2) moist, weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine interstitial pores; 20 percent cobbles and 25 percent gravel; noneffervescent; slightly acid; clear smooth boundary.

Bt1--8 to 28 cm.; dark reddish brown (2.5YR 3/4) gravelly heavy clay loam or clay, dark reddish brown (2.5YR 3/4) moist, weak medium and coarse prismatic structure; very hard, friable, sticky and plastic; common very fine and few fine roots; very few fine and very fine tubular pores; 20 percent gravel and 5 percent cobbles; noneffervescent; neutral; clear wavy boundary.

Bt2--28 to 48 cm.; dark reddish brown (5YR 3/4) gravelly clay loam, dark reddish brown (5YR 3/4) moist, weak medium and coarse subangular blocky structure; very hard, friable, sticky and plastic; common very fine and few fine roots; few very fine tubular pores; common faint clay films on ped faces; 25 percent gravel and 10 percent cobbles; noneffervescent; neutral; abrupt irregular boundary.

C-- 48 to 71 cm.; pink (7.5YR 7/4) and reddish yellow (7.5YR 7/6) strongly weathered granite or granodiorite; massive; extremely hard, extremely firm; few roots in crevices; few clay films on rocks faces.

R--71 cm.; extremely hard granite bedrock.

Range of Characteristics

Depth to weathered bedrock: 25 to 50 cm.
Depth to bedrock: 50 to 76 cm.
Rock fragments: averages 10 to 35 percent in the control section
Reaction: slightly acid to neutral
Effervescence: noneffervescent
Organic matter: greater than 1 percent

A horizon
Hue: 7.5YR, 2.5YR
Value: 4 through 6 dry, 3 or 4 moist
Chroma: 2 through 4 dry or moist
Texture: sandy loam

B Horizon
Hue: 7.5YR, 5YR, 2.5YR
Value: 3 through 5 dry, 3 or 4 moist
Chroma: 3 through 6, dry or moist
Texture: clay loam, clay

Combate Series

Depth class: very deep
Drainage class: well
Permeability: moderately rapid
Landform: alluvial fans
Parent material: mixed
Slope range: 1 to 8 percent

Classification: Coarse-loamy, mixed, superactive, nonacid, thermic Ustic Torrifluvents

Typical Pedon

Representative profile of Combate loamy sand, in area of Combate - Diaspar complex, 1 to 5 percent slopes, located at a latitude of 31 degrees, 51 minutes, 18 seconds North and longitude of 110 degrees, 51 minutes, 35 seconds West.

5 to 20 percent of the surface is covered with gravel

A1--0 to 5 cm.; brown (10YR 5/3)loamy sand, dark brown (10YR 3/3) moist, single grain; loose, nonsticky and nonplastic; few fine roots; common fine irregular; noneffervescent; slightly acid; abrupt smooth boundary.

A2--5 to 32 cm.; brown (10YR 5/3) coarse sandy loam, dark brown (7.5YR 3/3) moist; single grain; soft, very friable, nonsticky and nonplastic; common fine roots; common fine irregular and few fine tubular pores; noneffervescent; slightly acid; clear smooth boundary.

C1--32 to 80 cm.; brown (7.5YR 4/3) sandy loam, very dark brown (7.5YR 2.5/3) moist; massive to weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common fine irregular and few fine tubular pores; 5 to 10 percent gravel; noneffervescent; neutral to slightly alkaline; clear smooth boundary.

C2--80 to 120 cm.; brown (7.5YR 4/4) sandy loam, dark brown (7.5YR 3/3) moist; massive to weak coarse subangular blocky structure; soft, friable, nonsticky and nonplastic; common fine roots; few fine tubular pores; 5 to 10 percent gravel; noneffervescent; slightly alkaline.

Range of Characteristics

Rock fragments: averages 5 to 15 percent in the control section
Reaction: slightly acid to slightly alkaline
Effervescence: noneffervescent to 50 cm. and nonefferescent to slightly effervescent below 50 cm.
Clay content: less than 18 percent
Organic matter: 1 to 3 percent in the surface

A horizon
  Hue: 10YR, 7.5YR
  Value: 3 through 5 dry, 2 through 4 moist
  Chroma: 2 through 4, dry or moist
  Texture: loamy sand, coarse sandy loam

C horizon
  Hue: 10YR, 7.5YR
  Value: 3 through 5 dry, 2 through 4 moist
  Chroma: 2 through 4, dry or moist
  Texture: sandy loam, coarse sandy loam, loamy sand

Some pedons have a buried paleosol in the lower substratum.
Some pedons particle size are averaging in the sandy family.

Diaspar Series

Depth class: very deep
Drainage class: well
Permeability: moderately rapid to moderate
Landform: fan terrace
Parent material: mixed
Slope range: 1 to 5 percent

Classification: Coarse-loamy, mixed, superactive, thermic Ustic Haplargids

Typical Pedon

Representative profile of Diaspar coarse loamy sand, in area of Combate -Diaspar complex, 1 to 5 percent slopes, located at a latitude of 31 degrees, 51 minutes, 16 seconds North and longitude of 110 degrees, 51 minutes, 42 seconds West.

5 to 20 percent of the surface is covered with gravel

A1--0 to 5 cm.; yellowish brown (7.5YR 5/4)loamy sand, yellowish brown (7.5YR 4/4) moist, single grain; loose, nonsticky and nonplastic; many fine roots; common fine irregular; noneffervescent; slightly acid; abrupt smooth boundary.

A2--5 to 13 cm.; brown (7.5YR 5/3) coarse sandy loam, brown (7.5YR 4/3) moist; single grain to massive; soft, very friable, nonsticky and nonplastic; many fine roots; common fine irregular and few fine tubular pores; noneffervescent; slightly acid to neutral; abrupt smooth boundary.

Bt1--13 to 61 cm.; brown (7.5YR 4/3) sandy loam, dark brown (7.5YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; few fine tubular pores; common distinct clay films on ped faces and lining of pores; noneffervescent; neutral to slightly alkaline; abrupt wavy boundary.

Bt2--61 to 115 cm.; brown (7.5YR 4/4) coarse sandy loam, dark brown (7.5YR 3/4) moist; weak coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few fine roots; few fine tubular pores; few distinct clay bridges and few distinct clay films lining pores; noneffervescent; slightly alkaline; abrupt wavy boundary.

2Bt3--115 to 140 cm.; brown (7.5YR 4/4) sandy loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few fine roots; few fine tubular pores; common distinct clay films on ped faces and lining of pores; noneffervescent; slightly alkaline.

Range of Characteristics

Rock fragments: averages 5 to 35 percent in the control section
Reaction: slightly acid to slightly alkaline
Effervescence: noneffervesecnt to slightly effervescent
Organic matter: 0.5 to 2 percent in the surface

A horizon
  Hue: 7.5YR
  Value: 4 or 5 dry, 2 through 4 moist
  Chroma: 3 through 6, dry or moist
  Texture: loamy sand, coarse sandy loam

Bt horizon
  Hue: 5YR, 7.5YR
  Value: 3 through 6 dry, 3 through 5 moist
  Chroma: 3 through 6, dry or moist
  Texture: sandy loam, coarse sandy loam

Some pedons have buried paleosols below 100 cm.

Eloma Series

Depth class: very deep
Drainage class: well
Permeability: slow
Landform: fan terraces
Parent material: mixed
Slope range: 1 to 10 percent

Classification: Clayey-skeletal, mixed, superactive, thermic Ustic Haplargids

Typical Pedon

The Eloma series used in this soil resource inventory has the same soil range in characteristics used in soil surveys from the surrounding area. The only characteristics changed in this description is the surface texture and the slope. This was done to better represent what was observed on the Santa Rita Experimental Range. The typical pedon description for the Eloma series is from Soil Survey of San Pedro Valley, Arizona an interim report from the Cochise County, Douglas-Tombstone Part soil survey. Representative profile of Eloma sandy loam is in the area of Eloma-Caralampi-White House complex, 1 to 15 percent slopes from the Cochise County, Douglas-Tombstone Part soil survey area at a latitude of 31 degrees, 38 minutes, 30 seconds North and a longitude of 110 degrees, 21 minutes, 30 seconds West.

5 to 15 percent of the surface is covered with gravel and cobbles

A--0 to 5 cm.; brown (7.5YR 4/2) sandy loam, dark brown (7.5YR 3/2) moist, weak fine granular structure; soft, very friable, nonsticky and nonplastic; few fine roots; few fine interstitial pores; noneffervescent; slightly alkaline; abrupt smooth boundary.

Bt1--5 to 25 cm.; dark reddish brown (5YR 3/3) very gravelly clay loam, dark reddish brown (5YR 2.5/2) moist; moderate fine angular blocky structure; hard, firm, moderately sticky and moderately plastic; many very fine and fine roots; few fine tubular pores; many distinct clay films on ped faces, rock fragments in pores; 50 percent gravel; noneffervescent; neutral; abrupt smooth boundary.

Bt2--25 to 68 cm.; dark reddish brown (2.5YR 3/4) very gravely clay, dark reddish brown (2.5YR 2.5/4) moist; moderate fine and medium angular blocky structure; hard, firm, very sticky and very plastic; many very fine and fine roots; few fine tubular pores; many distinct clay films on ped faces, rock fragments and in pores; 50 percent gravel and 5 percent cobbles; noneffervescent; slightly alkaline; abrupt smooth boundary.

Bt3--68 to 150 cm.; dark reddish brown (2.5YR 3/4) extremely cobbly clay, dark reddish brown (2.5YR 2.5/4) moist; strong fine and medium angular blocky structure; hard, firm, very sticky and very plastic; many very fine and fine roots; few fine tubular pores; many distinct clay

films on ped faces, rock fragments and in pores; 35 percent gravel and 30 percent cobbles; noneffervescent; neutral.

Range of Characteristics

Rock fragments: averages more than 35 percent in the control section
Reaction: neutral to slightly alkaline
Effervescence: noneffervesecnt to slightly effervescent
Clay content: average more than 35 percent in the control section
Organic matter: 1 to 2 percent in the surface

A horizon
  Hue: 5YR, 7.5YR
  Value: 4 through 5 dry, 2.5 through 4 moist
  Chroma: 2 through 4, dry or moist
  Texture: sandy loam

Bt horizon
  Hue: 2.5YR, 5YR
  Value: 2.5 through 4 dry, 2.5 through 4 moist
  Chroma: 2 through 6, dry or moist
  Texture: clay, sandy clay, clay loam

Hayhook Series

Depth class: very deep
Drainage class: well
Permeability: moderately rapid
Landform: fan terraces
Parent material: mixed
Slope range: 0 to 5 percent

Classification: Coarse-loamy, mixed, superactive, thermic Typic Haplocambids

Typical Pedon

Representative profile of Hayhook loamy sand, in area of Hayhook - Pajarito complex, 0 to 5 percent slopes, located at a latitude of 31 degrees, 51 minutes, 12 seconds North and longitude of 110 degrees, 54 minutes, 23 seconds West.

5 to 15 percent of the surface is covered with gravel

A1--0 to 4 cm.; yellowish brown (10YR 5/4)loamy sand, brown (10YR 4/3) moist, weak thin platy structures; loose, nonsticky and nonplastic; common fine roots; common fine irregular pores; noneffervescent; neutral; abrupt smooth boundary.

Bw--4 to 40 cm.; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 3/4) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots; few fine tubular pores; noneffervescent; slightly alkaline; clear smooth boundary.

B/C--40 to 61 cm.; brown (7.5YR 4/3) gravelly coarse sandy loam, dark brown (7.5YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic; common fine roots; few fine tubular pores; 15 to 20 percent gravel; noneffervescent; slightly alkaline; clear wavy boundary.

2Bk1--61 to 85 cm.; dark yellowish brown (10YR 4/4) gravelly coarse sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; few fine tubular pores; 20 to 25 percent gravel; strongly effervescent; thin continuous calcium carbonate coatings on gravel; moderately alkaline; clear wavy boundary.

2Bk2--85 to 150 cm.; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; soft, friable, nonsticky and nonplastic; few fine roots; few fine tubular pores; strongly effervescent; few fine calcium carbonate filaments; moderately alkaline.

Range of Characteristics

Rock fragments: averages 5 to 35 percent in the control section
Reaction: neutral to moderately alkaline
Effervescence: noneffervescent to 50 cm.; below 50 cm. nonefferescent to strongly effervescent
Clay content: less than 18 percent
Organic matter: less than 1 percent

A horizon
- Hue: 10YR, 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 3 or 4, dry or moist
- Texture: loamy sand, coarse sandy loam

Bw and B/C horizon
- Hue: 10YR, 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam, coarse sandy loam, loamy sand

Bk horizon
- Hue: 10YR, 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 or 5, dry or moist
- Texture: sandy loam

Some pedons have a buried paleosol in the lower substratum.
Some pedons particle size are averaging in the sandy family.

Keysto Series

Depth class: very deep
Drainage class: well
Permeability: rapid
Landform: stream terraces, inset fans
Parent material: mixed
Slope range: 1 to 3 percent

Classification: Loamy-skeletal, mixed, thermic Ustic Torriorthents

Typical Pedon

Representative profile of Keysto sandy loam is in the area of Keysto-Riverwash complex, 1 to 3 percent slopes at a latitude of 31 degrees, 46 minutes, 53 seconds North and a longitude of 110 degrees, 53 minutes, 09 seconds West.

5 to 25 percent of the surface is covered with gravel and cobbles

A--0 to 7 cm.; brown (10YR 4/3) sandy loam, dark brown (10YR 3/2) moist, weak thin platy structure to single grain; loose, nonsticky and nonplastic; common fine roots; few fine irregular pores; noneffervescent; neutral; abrupt wavy boundary.

C1--7 to 76 cm.; brown (10YR 4/3) very cobbly sandy loam, dark brown (10YR 3/2) moist, massive; soft, very friable, nonsticky and nonplastic; common fine roots; common fine irregular pores; noneffervescent; neutral; clear wavy boundary.

C2--76 to 150 cm.; brown (10YR 4/3) extremely cobbly loamy sand, dark brown (10YR 3/3) moist, massive; soft, very friable, nonsticky and nonplastic; common fine and few medium roots; common fine irregular pores; noneffervescent; neutral.

Range of Characteristics

Rock fragments: averages 35 to 65 percent in the control section; gravel, cobbles and stones
Reaction: neutral to slightly alkaline
Effervescence: none to slightly effervescent
Organic matter: less than 0.5 percent

A and C horizons
- Hue: 10YR, 7.5YR
- Value: 3 through 5 dry, 2 through 4 moist
- Chroma: 2 through 4, dry or moist
- Textures: sandy loam, loamy sand

Lampshire Series

Depth class: very shallow to shallow
Drainage class: well
Permeability: moderately rapid
Landform: hills and mountains
Parent material: slope alluvium, colluvium, residuum
Slope range: 3 to 60 percent

Classification: Loamy-skeletal, mixed, superactive, nonacid, thermic
Ustic Torriorthents

Typical Pedon

The Lampshire series used in this soil resource inventory has the same soil range in characteristics used in soil surveys from the surrounding area. The typical pedon description for the Lampshire series is from the Tohono O'odham Nation soil survey and the Eastern Pima soil survey. Representative profile of Lampshire very gravelly sandy loam is in the area of Romero-Lampshire-Rock outcrop complex, 15 to 60 percent slopes from the Tohono O'odham soil survey area at a latitude of 32 degrees, 57 minutes, 45 seconds North and a longitude of 111 degrees, 37 minutes, 30 seconds West.

35 to 45 percent of the surface is covered with gravel, cobbles and stones

A1--0 to 5 cm.; dark grayish brown (10YR 3/2) very gravelly sandy loam, very dark gray (10YR 3/1) moist, weak thin platy structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and medium roots; common fine interstitial pores; 35 percent gravel; noneffervescent; neutral; abrupt smooth boundary.

C--5 to 20 cm.; very dark gray (10YR 3/1) very gravelly sandy loam, very dark gray (10YR 2/1) moist, massive; slightly hard, friable, nonsticky and nonplastic; common very fine, fine and medium roots; common fine interstitial and tubular pores; 40 percent gravel; non-effervescent; slightly acid; abrupt wavy boundary.

R--20 cm.; granite.

Range of Characteristics

Depth to bedrock: 10 to 50 cm.
Rock fragments: averages 35 to 70 percent in the control section
Reaction: slightly acid to neutral
Effervescence: noneffervescent
Clay content: less than 20 percent
Organic matter: greater than 1 percent

A and C horizons
Hue: 10YR, 7.5YR
Value: 4 or 5 dry, 2 or 3 moist
Chroma: 1 through 4 dry or moist
Texture: sandy loam

Lampshire taxadjunct Series

Depth class: moderately deep
Drainage class: well
Permeability: moderate
Landform: hills and mountains
Parent material: slope alluvium, colluvium, residuum
Slope range: 25 to 60 percent

Classification: Coarse-loamy, mixed, superactive, thermic Aridic Ustochrepts

Typical Pedon

Representative profile of Lampshire tax. cobbly fine sandy loam, in area of Lampshire tax.-Budlamp tax.-Woodcutter tax. complex, 15 to 60 percent slopes, located at a latitude of 31 degrees, 45 minutes, 29 seconds North and longitude of 110 degrees, 50 minutes, 33 seconds West.

35 to 50 percent of the surface is covered with gravel, cobbles and stones

A1--0 to 8 cm.; brown (10YR 5/4) cobbly fine sandy loam, dark yellowish brown (10YR 4/4) moist, weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common fine interstitial pores; noneffervescent; slightly acid; abrupt smooth boundary.

A2--8 to 26 cm.; brown (10YR 5/4) gravelly fine sandy loam, dark yellowish brown (10YR 4/4) moist, massive; soft, very friable, nonsticky and nonplastic; common very fine, fine and few medium roots; common fine tubular pores; noneffervescent; slightly acid; abrupt smooth boundary.

Bw--26 to 71 cm.; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly sticky and slightly plastic; common very fine, fine and few medium roots; common fine tubular pores; noneffervescent; neutral; clear wavy boundary.

Cr--71 to 100 cm.; weathered bedrock.

R--100 cm.; unweathered bedrock.

Range of Characteristics

Depth to weathered bedrock: 50 to 90 cm.
Depth to unweathered bedrock: 60 to 100 cm.
Rock fragments: averages less than 35 percent in the control section
Reaction: moderately acid to neutral
Effervescence: noneffervescent
Clay content: less than 20 percent
Organic matter: greater than 1 percent

A horizons
Hue: 10YR, 7.5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 2 through 4 dry or moist
Texture: fine sandy loam

B horizon
Hue: 7.5YR, 5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 3 or 4 dry or moist
Texture: loam, fine sandy loam

The soil properties of this soil are outside of the recognized soil series by one or more differentiating characteristics. This soil is moderately deep to bedrock, has less than 35 percent coarse fragments and is in a higher precipitation zone making it a taxadjunct of the Lampshire series. This taxadjunct soil could potentiality be a new soil series if a significant area is eventually recognized.

Mabray Series

Depth class: very shallow to shallow
Drainage class: well
Permeability: moderate
Landform: hills, mountains
Parent material: slope alluvium, colluvium and residuum
Slope range: 10 to 60 percent

Classification: Loamy-skeletal, carbonatic, thermic Ustic Torriorthents

Typical Pedon

The Mabray series used in this soil resource inventory has the same soil range in characteristics used in soil surveys from the surrounding area. The only characteristics changed in this description is the slope range. This was done to better represent what was observed on the Santa Rita Experimental Range. The typical pedon description for the Mabray series is from Santa Cruz and Parts of Cochise and Pima Counties, Arizona soil survey. Representative profile of Mabray very gravelly loam, in an area of Mabray-Chiricahua-Rock outcrop association, steep, located about 10 miles east of Amado, 300 feet north of the Glove Mine, approximately 1,250 feet north of the south quarter corner of section 30, T.20S., R.13E., Santa Cruz County.

45 to 55 percent of the surface is covered with gravel and cobbles

A1--0 to 2 cm.; dark grayish brown (10YR 4/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist, weak fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and few medium roots; common fine and very fine irregular pores; 35 percent gravel and 15 percent cobbles; violently effervescent; moderately alkaline; abrupt wavy boundary.

A2--2 to 31 cm.; dark grayish brown (10YR 4/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist, moderate fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and few medium roots; common fine and very fine irregular pores; 30 percent gravel and 45 percent cobbles; violently effervescent; common light gray (10YR 7/2) calcium carbonate coating on undersides of gravel and cobbles; moderately alkaline; abrupt irregular boundary.

R--31 to 61 cm.; white (10YR 8/1) extremely hard fractured limestone.

Range of Characteristics

Depth to bedrock: 10 to 50 cm.
Rock fragments: averages 35 to 75 percent in the control section
Reaction: moderately alkaline
Effervescence: strongly to violently effervescent
Organic matter: greater than 1 percent

A horizons
Hue: 10YR, 7.5YR
Value: 2 through 4 dry, 2 or 3 moist
Chroma: 2 through 4 dry, 1 through 3 moist
Texture: loam

Ck horizons (when present)
Hue: 10YR, 7.5YR
Value: 3 to 5, dry or moist
Chroma: 2 to 4, dry or moist
Textures: loam, fine sandy loam

Nahda Series

Depth class: moderately deep
Drainage class: well
Permeability: slow
Landform: fan terrace
Parent material: mixed
Slope range: 1 to 15 percent

Classification: Clayey-skeletal, mixed, superactive, thermic Typic Petroargids

Typical Pedon

Representative profile of Nahda gravelly sandy loam, Nahda-Rillino complex, 1 to 30 percent slopes, located at a latitude of 31 degrees, 54 minutes, 01 seconds North and longitude of 110 degrees, 47 minutes, 46 seconds West.

45 to 55 percent of the surface is covered with gravel and cobbles

A--0 to 8 cm.; reddish brown (5YR 4/4) gravelly sandy loam, dark reddish brown (5YR 3/3) moist, weak thin platy structure; soft, very friable, slightly sticky and slightly plastic; few very fine roots; few fine tubular pores; noneffervescent; slightly alkaline; abrupt smooth boundary.

Btk1--8 to 23 cm.; dark reddish brown (5YR 3/4) gravelly sandy clay, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; soft, friable, very sticky and very plastic; common very fine roots; few fine tubular pores; many distinct clay films on ped faces and coarse fragments; common calcium carbonate filaments on undersides of coarse fragments; slightly effervescent; slightly alkaline; clear wavy boundary.

Btk--23 to 61 cm.; reddish brown (2.5YR 4/4) very gravelly clay, reddish brown (2.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, very sticky and very plastic; common very fine roots; few fine tubular pores; many distinct clay films on ped faces and coarse fragments; many calcium carbonate filaments on undersides of coarse fragments; strongly effervescent; moderately alkaline; abrupt wavy boundary.

Bk--61 to 86 cm.; light reddish brown (2.5YR 6/3) very gravelly sandy loam, red (2.5YR 5/6) moist; massive; hard, firm, moderately sticky and moderately plastic; few very fine roots; few fine tubular pores; common hard medium calcium carbonate masses many calcium carbonate filaments on undersides of coarse fragments; violently effervescent; moderately alkaline; abrupt wavy boundary.

2Bkm--86 to 100 cm.; indurated calcium carbonate hardpan.

Range of Characteristics

Rock fragments: averages greater than 35 percent in the control section
Reaction: neutral to moderately alkaline
Effervescence: noneffervesecnt to violently effervescent
Organic matter: less than 1 percent in the surface
Depth to hardpan: 50 to 100 cm.

A horizon
  Hue: 5YR, 7.5YR
  Value: 5 through 7 dry, 3 through 5 moist
  Chroma: 3 through 6, dry or moist
  Texture: gravelly sandy loam

Bt horizon
  Hue: 2.5YR, 5YR
  Value: 4 through 6, dry or moist
  Chroma: 4 through 8, dry or moist
  Texture: sandy clay, clay

Btk horizon
  Hue: 2.5YR, 5YR
  Value: 4 through 6 dry, 4 or 5 moist
  Chroma: 4 through 8, dry or moist
  Texture: sandy clay, clay

Oversight Series

Depth class: very deep
Drainage class: well
Permeability: rapid
Landform: stream terraces, inset fans
Parent material: mixed
Slope range: 1 to 3 percent

Classification: Loamy-skeletal, mixed, superactive, thermic Aridic Ustochepts

Typical Pedon

Representative profile of Oversight fine sandy loam is in the area of Oversight fine sandy loam, 1 to 3 percent slopes at a latitude of 31 degrees, 45 minutes, 42 seconds North and a longitude of 110 degrees, 50 minutes, 05 seconds West.

5 to 35 percent of the surface is covered with gravel and cobbles
Some areas have a surface leaf litter.

A--0 to 10 cm.; brown (7.5 4/4) fine sandy loam, dark brown (7.5YR 3/4) moist, weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; few fine irregular pores; noneffervescent; neutral; abrupt smooth boundary.

Bw--10 to 38 cm.; brown (7.5YR 4/3) cobbly fine sandy loam, dark brown (7.5YR 3/3) moist, weak fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common very fine and fine roots; common fine tubular pores; noneffervescent; neutral; clear wavy boundary.

B/C--38 to 130 cm.; brown (7.5YR 5/4) very cobbly sandy loam, brown (7.5YR 4/4) moist, massive; soft, friable, nonsticky and nonplastic; common fine and few medium roots; common fine tubular pores; noneffervescent; neutral.

Range of Characteristics

Rock fragments: averages more than 35 percent gravel and/or cobbles in the control section
Reaction: slightly acid to neutral
Effervescence: noneffervescent
Clay content: less than 18 percent in the control section.

A horizon
Hue: 7.5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 2 through 4, dry or moist
Textures: fine sandy loam, sandy loam

B/C horizons
Hue: 7.5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 3 or 4, dry or moist
Textures: fine sandy loam, sandy loam

Pajarito Series

Depth class: very deep
Drainage class: well
Permeability: moderately rapid
Landform: fan terraces
Parent material: mixed
Slope range: 0 to 5 percent

Classification: Coarse-loamy, mixed, superactive, thermic Typic Haplocambids

Typical Pedon

Representative profile of Pajarito sandy loam, in area of Hayhook - Pajarito complex, 0 to 5 percent slopes, located at a latitude of 31 degrees, 51 minutes, 13 seconds North and longitude of 110 degrees, 54 minutes, 24 seconds West.

5 to 15 percent of the surface is covered with gravel

A1--0 to 4 cm.; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist, weak thin platy structures to single grain; loose, nonsticky and nonplastic; few fine roots; few fine tubular pores; noneffervescent; slightly alkaline; abrupt smooth boundary.

A2--4 to 11 cm.; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic; common fine roots; few fine tubular pores; noneffervescent; slightly alkaline; clear smooth boundary.

Bw--11 to 40 cm.; brown (7.5YR 4/4) fine sandy loam, dark brown (7.5YR 3/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; few fine tubular pores; strongly effervescent; common fine calcium carbonate filaments; moderately alkaline; clear wavy boundary.

Bk1--40 to 74 cm.; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; few fine tubular pores; strongly effervescent; common fine calcium carbonate filaments; moderately alkaline; clear wavy boundary.

Bk2--74 to 160 cm.; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; few fine tubular pores; strongly effervescent; common fine calcium carbonate filaments; moderately alkaline.

Range of Characteristics

Rock fragments: averages less than 15 percent in the control section
Reaction: slightly alkaline to moderately alkaline
Effervescence: noneffervescent to strongly effervescent (effervescence above 50 cm.).
Clay content: less than 18 percent
Organic matter: less than 1 percent

A horizon
- Hue: 10YR, 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 through 6, dry or moist
- Texture: sandy loam

Bw horizon
- Hue: 10YR, 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 or 5, dry or moist
- Texture: sandy loam, coarse sandy loam

Bk horizon
- Hue: 10YR, 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 or 5, dry or moist
- Texture: sandy loam, fine sandy loam

Some pedons have a buried paleosol in the lower substratum.

Pantak Series

Depth class: very shallow to shallow
Drainage class: well
Permeability: moderate
Landform: hills and mountains
Parent material: slope alluvium, colluvium, residuum
Slope range: 10 to 40 percent

Classification: Loamy-skeletal, mixed, superactive, thermic Lithic Ustic Haplargids

Typical Pedon

The Pantak series used in this soil resource inventory has the same soil range in characteristics used in soil surveys from the surrounding area. The typical pedon description for the Pantak series is from the Tohono O'odam Nation soil survey and the Eastern Pima soil survey. Representative profile of Pantak very gravelly sandy loam is in the area of Lampshire-Pantak-Rock outcrop complex, 25 to 60 percent slopes from the Tohono O'odham soil survey area at a latitude of 31 degrees, 48 minutes, 50 seconds North and a longitude of 111 degrees, 35 minutes, 00 seconds West.

35 to 55 percent of the surface is covered with gravel, cobbles and stones

A1--0 to 3 cm.; brown to dark brown (10YR 4/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist, weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine roots; common fine interstitial pores; 40 percent gravel; noneffervescent; moderately acid; abrupt wavy boundary.

A/B--3 to 10 cm.; brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3) moist, weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots; common fine tubular pores; 45 percent gravel; noneffervescent; moderately acid; abrupt wavy boundary.

Bt--10 to 36 cm.; yellowish brown (10YR 5/4) very gravelly sandy clay loam, dark yellowish brown (10YR 3/4) moist, weak fine subangular blocky structure; soft, very friable, sticky and plastic; common fine and medium roots; common fine tubular pores; common distinct clay films on rock fragments; 50 percent gravel; noneffervescent; moderately acid; abrupt wavy boundary.

R--36 cm.; andesite

Range of Characteristics

Depth to bedrock: 10 to 50 cm.
Rock fragments: averages 35 to 65 percent in the control section
Reaction: moderately alkaline to neutral
Effervescence: noneffervescent
Calcium carbonate: in some pedons; can be found in the bedrock fractures
Clay content: less than 20 to 35 percent
Organic matter: greater than 1 percent

A horizon
- Hue: 10YR, 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 2 through 4, dry or moist
- Texture: sandy loam

B Horizon
- Hue: 10YR, 7.5YR, 5YR
- Value: 4 or 5, dry or moist
- Chroma: 2 through 4, dry or moist
- Texture: sandy loam, sandy clay loam, clay loam

Pinalino Series

Depth class: very deep
Drainage class: well
Permeability: moderately slow
Landform: fan terrace
Parent material: mixed
Slope range: 3 to 10 percent

Classification: Loamy-skeletal, mixed, superactive, thermic Typic Calciargids

Typical Pedon

The Pinalino series used in this soil resource inventory has the same soil range in characteristics used in soil surveys from the surrounding area. The only characteristics changed in this description is the surface texture and the slope. This was done to better represent what was observed on the Santa Rita Experimental Range. The typical pedon description for the Pinalino series is from Eastern Pima soil survey. Representative profile of Pinalino gravelly sandy loam, in area of Pinalino-Stagecoach complex, 5 to 16 percent slopes, located about 2,145 feet north and 1,570 feet west of the southwest corner of section 31, T.12S., R.14E.

45 to 55 percent of the surface is covered with gravel and cobbles

A--0 to 5 cm.; brown (7.5YR 5/4) gravelly sandy loam, dark brown (7.5YR 3/4) moist, weak moderately thick platy structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many fine irregular pores; noneffervescent; neutral; abrupt wavy boundary.

Bt1--5 to 15 cm.; reddish brown (2.5YR 4/4) extremely cobbly sandy clay loam, dark reddish brown (2.5YR 3/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; many very fine, common fine, and few medium and coarse roots; common fine and very fine tubular pores; common faint clay films bridging sand grains; noneffervescent; neutral; clear wavy boundary.

Bt2--15 to 51 cm.; reddish brown (2.5YR 4/4) extremely cobbly sandy clay loam, dark reddish brown (2.5YR 3/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common very fine and few fine roots; many very fine tubular pores; common faint clay films on ped faces and bridging sand grains; slightly effervescent; slightly alkaline; clear wavy boundary.

Btk3--51 to 76 cm.; red (2.5YR 4/6) extremely cobbly sandy clay loam, dark red (2.5YR 3/6) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; common very fine and few fine and medium roots; few very fine and fine tubular pores; many faint clay films on ped faces, coarse fragments and lining of pores; slightly effervescent; moderately alkaline; abrupt wavy boundary.

2Bk--76 to 150 cm.; pink (5YR 8/3 and 7/3) extremely gravelly sandy clay loam, light reddish brown and yellowish red (5YR 7/3, 6/3 and 5/6) moist; weak fine subangular blocky structure; very hard, firm, sticky and plastic; weakly cemented in places; few very fine and fine roots; common very fine and fine tubular pores; many coarse white (5YR 8/1) calcium carbonate masses; violently effervescent; moderately alkaline.

Range of Characteristics

Rock fragments: averages greater than 35 percent in the control section
Reaction: neutral to moderately alkaline
Effervescence: noneffervesecnt to violently effervescent
Depth to calcic horizon: 13 to 100 cm.
Clay Content: average more than 18 percent in the control section
Organic matter: less than 1 percent

A horizon
- Hue: 7.5YR, 5YR
- Value: 4 through 6 dry, 4 through 6 moist
- Chroma: 2 through 4 dry or moist
- Texture: sandy loam

Bt and Btk horizons
- Hue: 2.5YR, 5YR, 7.5YR
- Value: 4 through 6 dry, 3 through 7 moist
- Chroma: 4 through 6, dry or moist
- Texture: sandy clay loam, clay loam, loam

Bk horizon
- Hue: 5YR, 7.5YR
- Value: 5 through 8 dry, 4 through 7 moist
- Chroma: 2 through 4 dry, 2 through 6 moist
- Texture: sandy clay loam, sandy loam, loam

Rillino Series

Depth class: very deep
Drainage class: well
Permeability: moderate
Landform: fan terrace
Parent material: mixed
Slope range: 3 to 30 percent

Classification: Coarse-loamy, mixed, superactive, thermic Typic Haplocalcids

Typical Pedon

Representative profile of Rillino gravelly sandy loam, in an area of Nahda-Rillino complex, 1 to 30 percent slopes, located at a latitude of 31 degrees, 54 minutes, 03 seconds North and longitude of 110 degrees, 47 minutes, 35 seconds West.

35 to 50 percent of the surface is covered with gravel

A--0 to 10 cm.; pinkish gray (7.5YR 6/2) gravelly sandy loam, brown (7.5YR 5/2) moist, single grain; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many fine irregular pores; strongly effervescent; moderately alkaline; abrupt smooth boundary.

Bk1--10 to 46 cm.; brown (7.5YR 5/3) gravelly sandy loam, brown (7.5YR 4/3) moist; weak fine subangular blocky structure to massive; soft, very friable, slightly sticky and moderately plastic; many very fine and fine roots; few fine tubular pores; few distinct calcium carbonate filaments and few distinct calcium carbonate filaments on the undersides of coarse fragments; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2--46 to 115 cm.; brown (7.5YR 5/3) gravelly sandy loam, brown (7.5YR 4/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; few fine tubular pores; many distinct calcium carbonate filaments and many distinct calcium carbonate filaments on the undersides of coarse fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

2Bk3--115 to 150 cm.; light brown (7.5YR 5/3) very gravelly sandy loam, brown (7.5YR 5/3) moist; massive; hard, very firm, slightly sticky and slightly plastic; few very fine roots; few fine tubular pores; many distinct calcium carbonate filaments and many distinct calcium carbonate filaments on the undersides of coarse fragments; strongly effervescent; moderately alkaline.

Range of Characteristics

Rock fragments: averages 15 to 35 percent in the control section
Reaction: moderately alkaline
Effervescence: strongly to violently effervescent
Clay content: less than 18 percent
Organic matter: less than 1 percent

A horizon
- Hue: 10YR, 7.5YR
- Value: 5 through 7 dry, 3 through 5 moist
- Chroma: 2 through 4, dry or moist
- Texture: gravelly sandy loam

Bw and Bk horizons
- Hue: 10YR, 7.5YR
- Value: 5 through 7 dry, 4 through 6 moist
- Chroma: 2 through 4, dry or moist
- Texture: loam, sandy loam, coarse sandy loam

Sasabe Series

Depth class: very deep
Drainage class: well
Permeability: moderately slow
Landform: fan terraces
Parent material: mixed
Slope range: 1 to 8 percent

Classification: Fine, mixed, superactive, thermic Rustic Paleargids

Typical Pedon

Representative profile of Sasabe sandy loam is in the area of Sasabe - Baboquivari complex, 1 to 8 percent slopes; located at a latitude of 31 degrees, 48 minutes, 51 seconds North and longitude of 110 degrees, 51 minutes, 05 seconds West.

0 to 10 percent of the surface is covered with gravel and cobbles

A/C--0 to 4 cm.; brown (7.5YR 5/4) sandy loam, brown (7.5YR 4/4) moist, weak thin platy structure; soft, very friable, nonsticky and nonplastic; common fine roots; common fine interstitial and tubular pores; noneffervescent; neutral; abrupt smooth boundary.

A--4 to 13 cm.; brown (7.5YR 5/3) loamy sand, dark brown (7.5YR 3/3) moist, single grain; soft, very friable, nonsticky and nonplastic; common fine roots; common fine interstitial and tubular pores; noneffervescent; neutral; abrupt smooth boundary

Bt1--13 to 46 cm.; dusky red (2.5YR 4/4) clay, dusky red (2.5YR 3/4) moist; weak coarse prismatic structure parting to moderate medium subangular blocky structure; hard, friable, very sticky and very plastic; common fine roots; common fine tubular pores; many distinct clay films on ped faces; noneffervescent; neutral; clear smooth boundary.

Bt2--46 to 80 cm.; intermingled dusky red (2.5YR 4/4 and 2.5YR 3/4) clay, dusky red (2.5YR 3/4) and very dusky red (2.5YR 2.5/4) moist; moderate medium prismatic structure parting to strong medium angular blocky structure; very hard, firm, very sticky and very plastic; few fine roots; common fine tubular pores; many distinct clay films on ped faces; noneffervescent; slightly alkaline; clear wavy boundary.

Bt3--80 to 112 cm.; dusky red (2.5YR 3/4) sandy clay, very dusky red (2.5YR 2.5/4) moist; weak medium prismatic structure parting to moderate medium angular blocky structure; very hard, firm, very sticky and very plastic; few fine roots; few fine tubular pores; many distinct clay films on ped faces and pores; noneffervescent; slightly alkaline; clear wavy boundary.

2Btk--112 to 150 cm.; intermingled dusky red (2.5YR 4/4) and pink (7.5YR 7/3) sandy clay loam, dusky red (2.5YR 3/4) and light brown (7.5YR 6/3) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few fine tubular pores; common distinct clay films on ped faces and pores; common medium calcium carbonate masses; strongly effervescent; slightly alkaline; clear irregular boundary.

Range of Characteristics

Rock fragments: averages less than 35 percent in the control section
Reaction: neutral to slightly alkaline
Effervescence: noneffervescent to strongly effervescent; less than 15 percent calcium carbonate equivalent to 100 cm.
Clay content: average more than 35 percent in the control section

A horizon
- Hue: 5YR, 7.5YR
- Value: 3 through 6 dry or moist
- Chroma: 3 through 8, dry or moist
- Texture: sandy loam, loamy sand

Bt horizon
- Hue: 2.5YR, 5YR
- Value: 3 through 5 dry or moist
- Chroma: 3 through 8, dry or moist
- Texture: clay, sandy clay, sandy clay loam

Btk or C horizons (when present)
- Hue: 5YR, 7.5YR
- Value: 5 through 7 dry, 4 through 7 moist
- Chroma: 4 through 8, dry or moist
- Texture: sandy clay loam, sandy loam

Stagecoach Series

Depth class: very deep
Drainage class: well
Permeability: moderate
Landform: fan terrace
Parent material: mixed
Slope range: 3 to 15 percent

Classification: Loamy-skeletal, mixed, superactive, thermic Typic Haplocalcids

Typical Pedon

The Stagecoach series used in this soil resource inventory has the same soil range in characteristics used in soil surveys from the surrounding area. The only characteristics changed in this description is the surface texture and the slope. This was done to better represent what was observed on the Santa Rita Experimental Range. The typical pedon description for the Stagecoach series is from Eastern Pima soil survey. Representative profile of Stagecoach gravelly sandy loam, in an area of Stagecoach-Sahuarita association, 1 to 8 percent slopes, located about 25 feet north and 2,640 feet east of the southwest corner of section 25, T.15S., R.14E.

35 to 45 percent of the surface is covered with gravel

A--0 to 10 cm.; light brown (7.5YR 6/4) gravelly sandy loam, brown (7.5YR 4/4) moist, weak moderately thick platy structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; many fine irregular and common fine, medium and coarse tubular pores; strongly effervescent; moderately alkaline; abrupt smooth boundary.

Bw--10 to 25 cm.; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; many very fine and few fine and medium roots; common very fine, fine and medium tubular and interstitial pores; common fine distinct pinkish white (7.5YR 8/2) calcium carbonate filaments; violently effervescent; moderately alkaline; clear smooth boundary.

Bk1--25 to 48 cm.; pink (7.5YR 7/4) very gravelly loam, brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many fine interstitial and tubular pores; thin continuous pinkish white (7.5YR) calcium carbonate coatings on gravel and as soft and hard masses; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2--48 to 100 cm.; pinkish gray (7.5YR 7/2) and pinkish white (7.5YR 8/2) extremely gravelly loam, light brown (7.5YR 6/4) and pinkish gray (7.5YR 7/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; weakly cemented in places; common fine and very fine and few medium and coarse roots; common fine interstitial and few fine

and medium tubular pores; many medium and coarse distinct calcium carbonate masses; violently effervescent; moderately alkaline; clear wavy boundary.

2C--100 to 150 cm.; light brown (7.5YR 6/4) very gravelly loamy sand; brown (7.5YR 5/4) moist; single grain; loose, nonsticky and nonplastic; few fine and very fine roots; many fine interstitial pores; common thin calcium carbonate coatings on gravel; violently effervescent; moderately alkaline.

Range of Characteristics

Rock fragments: averages 35 to 75 percent in the control section
Reaction: slightly alkaline to moderately alkaline
Effervescence: strongly to violently effervescent
Depth to calcic horizon: 25 to 64 cm.
Organic matter: less than 1 percent

A and B horizons
- Hue: 10YR, 7.5YR
- Value: 5 through 8 dry, 4 through 7 moist
- Chroma: 2 through 6, dry or moist
- Texture: loam, sandy loam, loamy sand

C horizon
- Hue: 10YR, 7.5YR
- Value: 5 through 8, dry or moist
- Chroma: 3 through 6, dry or moist
- Texture: loamy sand, sandy loam

Tombstone Series

Depth class: very deep
Drainage class: well
Permeability: moderately rapid
Landform: fan terrace
Parent material: mixed
Slope range: 0 to 5 percent

Classification: Loamy-skeletal, mixed, superactive, thermic Ustic Haplocalcids

Typical Pedon

Representative profile of Tombstone sandy loam, in area of Tombstone complex, 0 to 5 percent slopes, located at a latitude of 31 degrees, 54 minutes, 24 seconds North and longitude of 110 degrees, 49 minutes, 54 seconds West.

35 to 45 percent of the surface is covered with gravel and cobbles

A--0 to 10 cm.; brown (7.5YR 4/3) sandy loam, dark brown (7.5YR 3/3) moist, weak thin platy structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many fine irregular and tubular pores; strongly effervescent; moderately alkaline; abrupt smooth boundary.

Bw--10 to 23 cm.; brown (7.5YR 5/2) gravelly sandy loam, brown (7.5YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine and few fine and medium roots; common very fine and fine tubular pores; common fine distinct pinkish white (7.5YR 8/2) calcium carbonate filaments on undersides of coarse fragments; violently effervescent; moderately alkaline; clear smooth boundary.

Bk1--23 to 74 cm.; brown (7.5YR 5/3) very gravelly sandy loam, brown (7.5YR 4/2) moist; massive; loose, slightly sticky and nonplastic; many very fine and few fine roots; common very fine and fine tubular pores; many fine distinct pinkish white (7.5YR 8/2) calcium carbonate filaments and prominent calcium carbonate coats on coarse fragments; violently effervescent; moderately alkaline; clear smooth boundary.

Bk3--74 to 150 cm.; brown (7.5YR 5/3) very gravelly loamy sand, brown (7.5YR 4/3) moist; massive; loose, nonsticky and nonplastic; common very fine and few fine roots; common very fine and fine interstitial and tubular pores; many fine distinct pinkish white (7.5YR 8/2) calcium carbonate filaments and prominent calcium carbonate coats on coarse fragments; violently effervescent; moderately alkaline.

Range of Characteristics

Rock fragments: averages 35 to 75 percent in the control section
Reaction: slightly alkaline to moderately alkaline
Effervescence: strongly to violently effervescent
Depth to calcic horizon: 10 to 50 cm.; weakly cemented in some pedons

A horizon
  Hue: 10YR, 7.5YR
  Value: 4 through 7 dry, 2 through 5 moist
  Chroma: 2 through 4, dry or moist
  Texture: sandy loam, gravelly sandy loam

Bw and Bk horizons
  Hue: 10YR, 7.5YR
  Value: 3 through 7 dry or moist
  Chroma: 2 through 4 dry, 1 through 4 moist
  Texture: sandy loam, loamy sand

Topowa Series

Depth class: very deep
Drainage class: well
Permeability: moderately slow
Landform: fan terrace
Parent material: mixed
Slope range: 1 to 8 percent

Classification: Loamy-skeletal, mixed, superactive, thermic Typic Haplargids

Typical Pedon

Representative profile of Topowa coarse sandy loam, in area of Topowa complex, 1 to 8 percent slopes, located at a latitude of 31 degrees, 48 minutes, 52 seconds North and longitude of 110 degrees, 56 minutes, 18 seconds West.

5 to 20 percent of the surface is covered with gravel

A1--0 to 15 cm.; brown (7.5YR 5/4) coarse sandy loam, dark brown (7.5YR 3/4) moist, weak thin platy to weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; common fine irregular and few fine tubular pores; noneffervescent; neutral; abrupt smooth boundary.

Bt1--15 to 26 cm.; reddish brown (5YR 5/4) sandy loam, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common fine irregular and few fine tubular pores; many distinct clay films on ped faces, coarse fragments and lining of pores; noneffervescent; neutral; clear smooth boundary.

2Bt2--26 to 61 cm.; reddish brown (5YR 4/4) very gravelly sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, very sticky and plastic; many fine roots; few fine tubular pores; many distinct clay films on ped faces, coarse fragments and lining of pores; noneffervescent; slightly alkaline; clear smooth boundary.

2Bt3--61 to 150 cm.; reddish brown (2.5YR 4/4) very gravelly sandy clay, dark reddish brown (2.5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, very sticky and very plastic; few very fine roots; few fine tubular pores; many distinct clay films on ped faces, coarse fragments and lining of pores; noneffervescent; slightly alkaline.

Range of Characteristics

Rock fragments: averages greater than 35 percent in the control section
Reaction: neutral to slightly alkaline
Effervescence: noneffervescent to strongly effervescent (less than 10 percent calcium carbonate equivalent)
Clay Content: average more than 18 percent in the control section
Organic matter: less than 1 percent

A horizon
- Hue: 7.5YR, 5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 through 6 dry, 3 or 4 moist
- Texture: coarse sandy loam

Bt horizons
- Hue: 2.5YR, 5YR
- Value: 3 through 5 dry, 3 or 5 moist
- Chroma: 3 through 6, dry or moist
- Texture: sandy clay loam, sandy loam

Tubac Series

Depth class: very deep
Drainage class: well
Permeability: slow
Landform: basin floor
Parent material: mixed
Slope range: 0 to 2 percent

Classification: Fine, mixed, superactive, thermic Typic Paleargids

Typical Pedon

Representative profile of Tubac sandy loam, in area of Tubac complex, 0 to 2 percent slopes, located at a latitude of 31 degrees, 54 minutes, 43 seconds North and longitude of 110 degrees, 53 minutes, 37 seconds West.

0 to 10 percent of the surface is covered with gravel

A--0 to 5 cm.; brown (7.5YR 4/4) sandy loam, dark brown (7.5YR 3/4) moist, moderate thin platy structure parting to weak fine granular structure; soft, very friable, moderately sticky and moderately plastic; many very fine and fine tubular pores; noneffervescent; neutral; abrupt smooth boundary.

Bt1--5 to 31 cm.; brown (7.5YR 4/4) clay, dark brown (7.5YR 3/4) moist; common medium and fine angular blocky structure; hard, firm, very sticky and very plastic; few fine roots; common very fine and fine tubular pores; many prominent clay films on ped faces and lining pores; few fine distinct irregular manganese coats; noneffervescent; neutral; clear smooth boundary.

Bt2--31 to 58 cm.; brown (7.5YR 4/4) clay, dark brown (7.5YR 3/4) moist; moderate fine and medium angular blocky structure; hard, firm, very sticky and very plastic; common very fine and fine tubular pores; many distinct clay films on ped faces and lining of pores; many medium distinct irregular manganese coats; noneffervescent; slightly alkaline; abrupt smooth boundary.

2Bt3--58 to 104 cm.; reddish brown (5YR 4/4) sandy clay, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, friable, very sticky and very plastic; few very fine and fine tubular pores; many distinct clay films on ped faces and lining of pores; noneffervescent; slightly alkaline; clear smooth boundary.

3Bt4--104 to 150 cm.; red (2.5YR 5/6) sandy clay loam, reddish brown (2.5YR 4/4) moist; moderate fine and medium angular blocky structure; very hard, firm, moderately sticky and moderately plastic; few very fine and fine tubular pores; many distinct clay films on ped faces and lining of pores; few medium distinct irregular manganese coats; noneffervescent; slightly alkaline.

Range of Characteristics

Rock fragments: averages 0 to 15 percent in the control section
Reaction: neutral to moderately alkaline
Effervescence: noneffervesecnt to strongly effervescent; calcium carbonate equivalent averages less than 15 percent in the control section
Clay content: average more than 35 percent in the control section
Organic matter: less than 1 percent in the surface

A horizon
- Hue: 5YR, 7.5YR
- Value: 4 through 7 dry, 3 through 6 moist
- Chroma: 2 through 4, dry or moist
- Texture: silt loam, sandy loam

Bt horizon
- Hue: 2.5YR, 5YR, 7.5YR
- Value: 4 through 6 dry, 3 through 6 moist
- Chroma: 2 through 6, dry or moist
- Texture: clay, sandy clay, sandy clay loam

White House Series

Depth class: very deep
Drainage class: well
Permeability: slow
Landform: fan terraces
Parent material: mixed
Slope range: 1 to 10 percent

Classification: Fine, mixed, superactive, thermic Ustic Haplargids

Typical Pedon

The White House series used in this soil resource inventory has the same soil range in characteristics used in soil surveys from the surrounding area. The only characteristics changed in this description is the surface texture and the slope. This was done to better represent what was observed on the Santa Rita Experimental Range. The typical pedon description for the White House series is from Eastern Pima soil survey. Representative profile of White House sandy loam is in the area of Bernardino-White House complex, 1 to 15 percent slopes from about 1,980 feet south and 2,200 feet west of the northwest corner of section 36, T.19S., R.16E.

5 to 15 percent of the surface is covered with gravel and cobbles

A--0 to 5 cm.; brown (7.5YR 4/2) sandy loam, dark brown (7.5YR 3/2) moist, weak thin platy structure parting to moderate fine granular structure; slightly hard, friable, nonsticky and nonplastic; common fine roots; many fine interstitial pores; noneffervescent; slightly acid; abrupt smooth boundary.

B/A--5 to 8 cm.; dark reddish gray (5YR 4/2) clay loam, dark reddish brown (5YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; many fine roots; common fine tubular pores; 10 percent gravel; noneffervescent; slightly acid; clear smooth boundary.

Bt1--8 to 20 cm.; reddish brown (5YR 3/4) clay, dark reddish brown (5YR 3/2) moist; weak coarse prismatic structure; very hard, friable, very sticky and very plastic; common fine roots; common very fine tubular pores; common faint clay films on ped faces; 5 percent gravel; noneffervescent; moderately alkaline; clear wavy boundary.

Bt2--20 to 46 cm.; dark reddish brown (2.5YR 3/4) clay, dark reddish brown (2.5YR 2.5/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky structure; very hard, friable, very sticky and very plastic; common fine roots; common very fine tubular pores; common faint clay films on ped faces; 5 percent gravel; noneffervescent; slightly alkaline; clear wavy boundary.

Bt3--46 to 92 cm.; red (2.5YR 5/6) clay, red (2.5YR 4/6) moist; weak coarse prismatic structure; very hard, friable, very sticky and very plastic; common very fine roots; few fine tubular pores; common faint clay films on ped faces; few medium Fe-Mn stains on ped faces; 5 percent gravel; noneffervescent; slightly alkaline; clear wavy boundary.

C--92 to 150 cm.; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; massive; hard, friable, sticky and plastic; few very fine roots; common very fine tubular pores; 5 percent gravel; noneffervescent; slightly alkaline.

Range of Characteristics

Rock fragments: averages less than 35 percent in the control section
Reaction: neutral to slightly alkaline
Effervescence: noneffervescent to slightly effervescent
Clay content: average more than 35 percent in the control section
Organic matter: averages 1 percent or more in the surface

A horizon
- Hue: 5YR, 7.5YR
- Value: 3 through 6 dry or moist
- Chroma: 2 through 6, dry or moist
- Texture: sandy loam

Bt horizon
- Hue: 2.5YR, 5YR
- Value: 3 through 6 dry or moist
- Chroma: 2 through 8, dry or moist
- Texture: clay, sandy clay, clay loam

Bk or C horizons
- Hue: 5YR, 7.5YR
- Value: 3 through 8 dry, 3 through 7 moist
- Chroma: 2 through 8, dry or moist
- Texture: sandy clay loam, clay loam

Woodcutter Series

Depth class: very shallow to shallow
Drainage class: well
Permeability: moderately slow
Landform: hills and mountains
Parent material: slope alluvium and residuum
Slope range: 10 to 40 percent

Classification: Loamy-skeletal, mixed, superactive, thermic Lithic Argiustolls

Typical Pedon

The Woodcutter series used in this soil resource inventory has the same soil range in characteristics used in soil surveys from the surrounding area. The only characteristics changed in this description is the slope range. This was done to better represent what was observed on the Santa Rita Experimental Range. The typical pedon description for the Woodcutter series is from Soil Survey of San Pedro Valley, Arizona an interim report from the Cochise County, Douglas-Tombstone Part soil survey. Representative profile of Woodcutter very gravelly fine sandy loam is in the area of Budlamp-Woodcutter complex, 15 to 60 percent slopes from the Cochise County, Douglas-Tombstone Part soil survey area at a latitude of 32 degrees, 30 minutes, 10 seconds North and a longitude of 110 degrees, 22 minutes, 30 seconds West.

35 to 45 percent of the surface is covered with gravel, cobbles and stones

A1--0 to 5 cm.; brown (10YR 4/3) very gravelly fine sandy loam, very dark grayish brown (10YR 3/2) moist, weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common fine interstitial pores; 45 percent gravel and 10 percent cobbles; noneffervescent; moderately acid; clear smooth boundary.

Bt1--5 to 15 cm.; dark brown (7.5YR 3/3) very gravelly loam, very dark brown (7.5YR 2/2) moist, moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common fine irregular pores; 45 percent gravel and 10 percent cobbles; noneffervescent; slightly acid; abrupt smooth boundary.

Bt2--15 to 30 cm.; reddish brown (5YR 4/3) very gravelly clay loam, dark reddish brown (5YR 3/3) moist, moderate fine subangular blocky structure; soft, friable, moderately sticky and moderately plastic; common very fine and fine roots; common fine irregular and tubular pores; many distinct clay films on ped faces, in pores, and on rock fragments; 30 percent gravel and 10 percent cobbles; noneffervescent; neutral; abrupt smooth boundary.

2R--30 cm.; unweathered granite

Range of Characteristics

Depth to bedrock: 10 to 50 cm.
Rock fragments: averages 35 to 65 percent in the control section
Reaction: moderately acid to neutral
Effervescence: noneffervescent
Organic matter: 1 to 2 percent

A horizon
- Hue: 10YR, 7.5YR
- Value: 3 through 5 dry, 2 through 4 moist
- Chroma: 1 through 4, dry or moist
- Texture: fine sandy loam, loam

B Horizon
- Hue: 7.5YR, 5YR
- Value: 2 through 5 dry, 2 through 4 moist
- Chroma: 1 through 6 dry, 1 through 4 moist
- Texture: sandy clay loam, clay loam

Woodcutter taxadjunct Series

Depth class: moderately deep
Drainage class: well
Permeability: moderately slow
Landform: hills and mountains
Parent material: slope alluvium and residuum
Slope range: 10 to 40 percent

Classification: Loamy-skeletal, mixed, superactive, thermic Aridic Argiustolls

Typical Pedon

Representative profile of Woodcutter tax. very gravelly fine sandy loam, in area of Lampshire tax.-Budlamp tax.-Woodcutter tax. complex, 15 to 60 percent slopes, located at a latitude of 31 degrees, 45 minutes, 36 seconds North and longitude of 110 degrees, 50 minutes, 31 seconds West.

35 to 45 percent of the surface is covered with gravel, cobbles and stones

A--0 to 10 cm.; dark brown (7.5YR 3/2) very gravelly fine sandy loam, very dark brown (7.5YR 2.5/2) moist, weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; few fine interstitial and tubular pores; noneffervescent; moderately acid; clear smooth boundary.

Bt--10 to 40 cm.; reddish brown (5YR 4/4) very gravelly sandy clay loam, dark reddish brown (5YR 3/4) moist, moderate fine granular structure; slightly hard, very friable, sticky and plastic; common very fine and fine roots; few fine tubular pores; noneffervescent; slightly acid; abrupt smooth boundary.

B/C--40 to 64 cm.; brown (7.5YR 5/4) extremely gravelly fine sandy loam, brown (7.5YR 4/4) moist, massive; soft, friable, slightly sticky and slightly plastic; few very fine and fine roots; few fine tubular pores; few faint clay films in pores and on rock fragments; noneffervescent; slightly acid; clear wavy boundary.

Cr--64 to 71 cm.; weathered bedrock

R-- 71 cm.; unweathered bedrock

Range of Characteristics

Depth to weathered bedrock: 40 to 75 cm.
Depth to unweathered bedrock: 60 to 100 cm.
Rock fragments: averages 35 to 70 percent in the control section
Reaction: moderately acid to neutral
Effervescence: noneffervescent
Organic matter: 1 to 2 percent

A horizon
Hue: 10YR, 7.5YR
Value: 3 through 5 dry, 2 through 4 moist
Chroma: 1 through 4, dry or moist
Texture: fine sandy loam, loam

B and B/C horizons
Hue: 7.5YR, 5YR
Value: 3 or 4 dry or moist
Chroma: 3 or 4 dry or moist
Texture: sandy clay loam, fine sandy loam

The soil properties of this soil are outside of the recognized soil series by one or more differentiating characteristics. This soil is moderately deep to bedrock making it a taxadjunct of the Woodcutter series. This taxadjunct soil could potentiality be a new soil series if a significant area is eventually recognized.

Glossary

1. Alluvial fan. A low, outspread, relatively flat to gently sloping mass of alluvium, shaped like an open fan or a segment of a cone, deposited by a stream at the place where it issues from a narrow mountain valley upon a plain or broad valley, or where a tributary stream is near or at its junction with the main stream, or wherever a constriction in a valley abruptly ceases or the gradient of the stream suddenly decreases; it is steeper near the mouth of the valley where its apex points upstream, and it slopes gently and convexly outward with gradually decreasing gradient.

2. Argillic horizon (Bt). A subsurface horizon into which clay has moved. It has at about a third more clay than the horizons above. The presence's of clay films on ped faces and in the soil pores is evidences of clay movement.

3. Available water capacity.
The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in a 60 inch profile or to a limiting layer is expressed as:

very low	0 to 3
low	3 to 6
moderate	6 to 9
high	9 to 12
very high	more than 12

4. Basin Floor. A general term for the nearly level to gently sloping, bottom surface of an intermountain basin (bolson). Component landforms include playas, broad alluvial flats containing ephemeral drainageways, and relict alluvial and lacustrine surfaces that rarely if ever are subject to flooding. Where drainage systems are well developed alluvial plains are dominant and lake plains are absent or of limited extent. Basin floors grade mountain ward to distal parts of the piedmont slopes.

5. Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, diluted hydrochloric acid.

6. Calcic horizon (Bk). Is a horizon of accumulation of calcium carbonate or of calcium and magnesium carbonate. If the texture of the soil is greater than 18 percent clay the calcic horizon will be more than six inches thick and have more than 15 percent calcium carbonate equivalent and at least 5 percent calcium carbonate equivalent is required.

7. Calcium carbonate. Is used interchangeable with lime or limy.

8. Clay. As a soil separate, the mineral soil particles less than 0.002 millimeters in diameter. As a soil texture class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

9. Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

10. Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

11. Cobble. A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

12. Complex, soil. A map unit of two or more kinds of soil in such intricate pattern or so small in area that it is not practical to map them separately at the select scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

13. Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. The terms commonly used to describe consistence are:

Loose - Noncoherent when dry or moist; does not hold together in a mass.

Friable - When moist, crushes easily under gentle pressure between the thumb and forefinger and can be pressed together into a lump.

Firm - When moist, crushes under moderate pressure between the thumb and forefinger, but resistance is distinctly noticeable.

Plastic - When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between the thumb and forefinger.

Sticky - When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard - When dry, moderately resistant to pressure; can be broken with difficulty between the thumb and forefinger.

Soft - when dry, breaks into powder or individual grains under very slight pressure.

Cemented - Hard, little affect by moistening.

14. Depth classes. Depth to which the soil is classified.

Very deep	greater than 150 centimeters
Deep	100 to 150 centimeters
Moderately deep	50 to 100 centimeters
Shallow	25 to 50 centimeters
Very shallow	less to 25 centimeters

15. Drainage class. The relative wetness of the soil under natural conditions as it pertains to wetness due to a water table.

Excessively drained. Water is removed very rapidly. The occurrence of internally free water commonly is very rare or very deep. The soils are commonly coarse-textured.

Somewhat excessively drained. Water is removed from the soil rapidly. Internal free water occurrence commonly is very rare or very deep. The soils are commonly coarse-textured.

Well drained. Water is removed from the soil readily but not rapidly. Internal free water occurrence commonly is deep or very deep; annual duration is not specified. Water is available to plants throughout most of the growing season in humid regions. Wetness does not inhibit growth of roots for significant periods during most growing seasons. The soils are mainly free of the deep to redoximorphic features that are related to wetness.

Moderately well drained. Water is removed from the soil somewhat slowly during some periods of the year. Internal free water occurrence commonly is moderately deep and transitory through permanent. The soils are wet for only a short period of time within the rooting depth during the growing season, but long enough that most mesophytic crops are affected.

Somewhat poorly drained. Water is removed slowly so that the soil is wet at a shallow depth for significant periods during the growing season. The occurrence of internal free water commonly is shallow to moderately deep and transitory to permanent. Wetness markedly restricts the growth of mesophytic crops, unless artificial drainage is provided.

Poorly drained. Water is removed so slowly that the soil is wet at shallow depths periodically during the growing season or remains wet for long periods. The occurrence of internal free water is shallow or very shallow and common or persistent. Freewater is commonly at or near the surface long enough during the growing season so that most mesophytic crops cannot be grown, unless the soil is artificially drained. The soil, however, is not continuously wet directly below plow-depth. Freewater at shallow depth is usually present.

Very poorly drained. Water is removed from the soil so slowly that free water remains at or near the ground surface during much of the growing season. The occurrence of internal free water is very shallow and persistent or permanent. Unless the soil is artificially drained, most mesophytic crops cannot be grown. The soils are commonly level or depressed and frequently ponded. If rainfall is high or nearly continuous, slope gradients may be greater.

16. Effervescence. In he field, cold 1N hydrochloric acid is used to test for carbonates. The amount and expression of effervescence is affected by size distribution and mineralogy as well as the amount of carbonates. Consequently, effervescence cannot be used to estimate the amount of carbonate. Four classes of effervescence are used:

noneffervescent- few to none bubbles seen
slightly effervescent -bubbles readily seen
strongly effervescent -bubbles form low foam
violently effervescent- thick foam forms quickly

17. Eluviation. The movement of materials in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

18. Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

19. Fan Alluvium. Unconsolidated clastic materials deposited on alluvial fans and fan terraces by running water, including gravel, sand, silt, clay and various mixtures of these.

20. Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

21. Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

22. Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called normal field capacity, normal moisture capacity, or capillary capacity.

23. Fine textured soil. Sandy clay, silty clay, and clay.

24. Flooding Frequency Classes, None-No reasonable possibility of flooding (near 0 percent chance of flooding in any year). Rare-Flooding unlikely but possible under unusual weather conditions (from near 0 to 5 percent chance or near 0 to 5 times in 100 years). Occasional-Flooding is expected infrequently under usual weather conditions (5 to 50 percent chance of flooding or 5 to 50 times in 100 years). Frequent-Flooding is

likely to occur often under usual weather conditions (more than a 50 percent chance of flooding or more than 50 times in 100 years). Common- Occasional and frequent classes can be grouped for certain purposes and called common flooding.

25. Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

26. Forb. Any herbaceous plant not a grass or a sedge.

27. Gravel. Rounded or angular fragments of rock up to 3 inched (2 millimeters to 7.6 centimeters) in diameter.

28. Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

29. Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can by smoothed over by ordinary tillage.

30. Hard rock. Rock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

31. Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

32. Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well-defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

33. Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon. An organic layer of fresh and decaying plant residue.

A horizon. The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon. The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon. The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlaying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon. The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlaying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon. Soft, consolidated bedrock beneath the soil.

R layer. Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

34. Hydrologic soil groups. Refers to soils grouped according to their runoff producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially rained and part is undrained.

35. Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

36. Inclusions. Soil components or miscellaneous areas that are not identified in the named map unit. Many areas of these components are too small to be delineated separately or cannot be identified by practical field methods or are deliberately placed in map units to avoid excessive detail on the map or legends. These are two types of inclusions. Similar inclusions are the named components in characteristics and properties and have the same major interpretations. Contrasting inclusions differ appreciably in one or more properties and the differences generally are great enough to affect major interpretations.

37. Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

38. Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

inches per hour	
Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

39. Large stones. Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

40. Lime. Chemically, lime is calcium oxide but, as the term is commonly used it is also calcium carbonate (CaCO3) and calcium hydroxide (Ca(OH)2).

41. Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less that 52 percent sand particles.

42. Medium textured soil, Very fine sandy loam, loam, silt loam, or silt.

43. Moderately coarse textured soil. Clay loam, sandy clay loam, and silty clay loam.

44. Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

45. Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

46. Organic matter. Plant and animal residue in the soil in various stages of decomposition.

47. Paleosols. Soils formed in past environments.

48. Parent material. The unconsolidated organic and mineral material in which soil forms.

49. Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

50. Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

	Inches per hour
Very slow	less than 0.06
Slow	0.06 to 0.2
Moderately slow	0.2 to 0.6
Moderate	0.6 inch to 2.0
Moderately rapid	2.0 to 6.0
Rapid	6.0 to 20
Very rapid	more than 20

51. Petrocalcic Horizon. A continuous or fractured, cemented or indurated calcic horizon cemented by carbonates and some silica. This is the same as a lime cemented hardpan or a cemented calcium carbonate hardpan.

52. Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

53. pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

54. Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has not properties restricting the penetration of roots to this depth.

55. Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by the association of species that differ from those on other range sites in kind or proportion of species or total production.

56. Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A solid that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.3 to 7.8
Moderately alkaline	7.8 to 8.4
Strongly alkaline	8.4 to 9.0
Very strongly alkaline	9.0 and higher

57. Relief. The elevations or inequalities of a land surface, considered collectively.

58. Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

59. Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more, for example, gravel, cobble, stones, and boulders.

60. Root zone. The part of the soil that can penetrated by plant roots.

61. Runoff. Runoff of water from a soil is determined by the percent slopes and the hydrologic group.

Hydrologic group	Percent slope 0 - 3	3 - 15	15 - 30	30+
A	v. slow	v.slow	slow	slow
B	slow	medium	rapid	rapid
C	slow	medium	rapid	rapid
D	medium	med/rapid	v.rapid	v.rapid

62. Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeters to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that has 85 percent or more sand and not more than 10 percent clay.

63. Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of rock are conglomerate, sandstone, limestone, and shale.

64. Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

65. shrink-swell. The shrinking if soil when dry and the swelling when wet. Shrinking and swelling can damage roads, building foundations, dams, and other structures. It can also damage plant roots.

66. Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay(0.002 millimeters) to the lower limit of very fine sand (0.05 millimeters). As a soil texture class, soil that is 80 percent or more silt and less than 12 percent clay.

67. Slope. The inclination of the land surface from the horizontal.

	Percent
Nearly level	0 to 3
Gently sloping or undulating	3 to 7
Strongly sloping or rolling	7 to 15
Moderately steep or hilly	15 to 25
Steep	25 to 55
Very steep	55+

68. Slow intake. The slow movement of water into the soil.

69. Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Slit	0.05 to 0.002
Clay	less than 0.002

70. Stream alluvium. Uncolsolidaed clastic material deposited on stream terraces by running water, including gravel, sand, silt, clay and various mixtures of these.

71. Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream, and representing the dissected remnants of an abandoned flood plain, stream bed, or valley floor produced during a former stage of erosion or deposition.

72. Structure, soil. The arrangement of primary soil particles into compounds or aggregates. The principal forms of soil structure are: platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive(particles adhering with out any regular cleavage, as in many hardpans).

73. Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

74. Substratum. The part of the soil below the solum.

75. Terrace. An embankment, or ridge, constructed across sloping soils on the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

76. Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportions of fine particles, are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, sandy clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse", "fine", or "very fine".

77. Water erosion classes. Water erosion is determined by the soil erodibility factor (K factor) of the soil's surface texture and percent slope. The K factor is a measure of the susceptibility of a soil to particle detachment and transport by rainfall. It is a quantitative value, experimentally determined.

	Percent slope			
K Factor	0-3	3-15	15-30	30+
0.02-0.20	slight	slight	moderate	severe
0.24-0.37	slight	moderate	severe	severe
0.43-0.69	moderate	severe	severe	v.severe

78. Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes results in the disintegration and decomposition of the material.

79. Wind Erodibility Group. A wind erodibility group (WEG) is a collection of soils that have similar properties affecting their resistance to soil blowing. The groups indicate the susceptibility to blowing. The lower the number the more susceptible the soil is to wind erosion.

Erosion	WEG
very high	1
high	2
moderately high	3
moderate	4, 4L
slightly	5-7
very slightly	8