Special Soil Survey Report

Sand Creek Massacre National Historic Site, Colorado

DRAFT

July, 2006

Acreage and Proportionate Extent of the Soils

Sand Creek Massacre National Historic Site, Colorado

Map symbol	Map unit name	Acres	Percent
3	Baca loam, 0 to 1 percent slopes	248	2.0
4	Baca-Wiley complex, 0 to 2 percent slopes	515	4.1
5	Bankard-Glenberg complex	873	7.0
6	Bijou loamy sand, 0 to 2 percent slopes	215	1.7
7	Bijou-Valent loamy sands, 1 to 8 percent slopes	1,218	9.7
10	Colby silt loam, 1 to 3 percent slopes	853	6.8
11	Colby silt loam, 3 to 9 percent slopes	79	0.6
12	Fluvaquents, nearly level*	785	6.3
13	Fort Collins sandy loam, 0 to 3 percent slopes	1,381	11.1
14	Goshen silt loam	13	0.1
15	Haverson clay loam	28	0.2
17	Keyner loamy sand, 0 to 2 percent slopes	203	1.6
21	Kim-Harvey-Stoneham loams, 1 to 3 percent slopes	827	6.6
22	Kim-Stoneham-Larimer loams, 3 to 12 percent slopes	338	2.7
24	Manzanola clay loam, 0 to 2 percent slopes	154	1.2
27	Olney loamy sand, 0 to 2 percent slopes	324	2.6
29	Playas	11	*
30	Richfield silt loam, 0 to 1 percent	240	1.9
32	Singerton-Pultney complex, 1 to 10 percent slopes	51	0.4
33	Stoneham loam, 0 to 3 percent slopes	358	2.9
35	Sundance loamy sand	368	2.9
37	Valent loamy sand, 3 to 10 percent slopes	1,714	13.7
38	Valent-Blownout land complex, 2 to 8 percent slopes	184	1.5
41	Wiley loam	1,514	12.1
Total		12,494	100.0

* Less than 0.1 percent.

Taxonomic Classification of the Soils

Sand Creek Massacre National Historic Site, Colorado

Soil name	Family or higher taxonomic classification
Baca	Fine, smectitic, mesic Aridic Haplustalfs
Bankard	Sandy, mixed, mesic Ustic Torrifluvents
Bijou	Coarse-loamy, mixed, superactive, mesic Ustic Haplargids
Colby	Fine-silty, mixed, superactive, calcareous, mesic Aridic Ustorthents
Fluvaquents, nearly level	Mixed, active, calcareous Fluvaquents
Fort Collins	Fine-loamy, mixed, superactive, mesic Aridic Haplustalfs
Glenberg	Coarse-loamy, mixed, superactive, calcareous, mesic Ustic Torrifluvents
Goshen	Fine-silty, mixed, superactive, mesic Pachic Argiustolls
Harvey	Fine-loamy, mixed, superactive, mesic Ustic Haplocalcids
Haverson	Fine-loamy, mixed, superactive, calcareous, mesic Aridic Ustifluvents
Keyner	Fine-loamy, mixed, superactive, mesic Haplic Ustic Natrargids
Kim	Fine-loamy, mixed, superactive, calcareous, mesic Ustic Torriorthents
Larimer	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Ustic Haplargids
Manzanola	Fine, smectitic, mesic Ustic Haplargids
Olney	Fine-loamy, mixed, superactive, mesic Ustic Haplargids
Playas	Fine, smectitic, calcareous, mesic Vertic Fluvaquents
Pultney	Fine-loamy, mixed, superactive, mesic Ustic Haplocalcids
Richfield	Fine, smectitic, superactive, mesic Aridic Argiustolls
Singerton	Fine-loamy, carbonatic, mesic Ustic Haplocalcids
Stoneham	Fine-loamy, mixed, superactive, mesic Aridic Haplustalfs
Sundance	Fine-loamy, mixed, superactive, mesic Ustic Haplargids
Valent	Mixed, mesic Ustic Torripsamments
Wiley	Fine-silty, mixed, superactive, mesic Aridic Haplustalfs

Map Unit Description

Sand Creek Massacre National Historic Site, Colorado

3 - Baca loam, 0 to 1 percent slopes

Mean annual precipitation:
Mean annual temperature: 54 to 54 degrees F

Frost-free period: 150 to 170 days
Farmland class: Prime farmland if irrigated

Baca and similar soils

Extent: about 85 percent of the unit
Landform(s): upland flats
upland swales
Slope gradient: 0 to 1 percent
Parent material: loess
Restrictive feature(s): none
Seasonal high water table: greater than 60 inches
Flooding frequency none
Ponding frequency: none

Soil loss tolerance (T factor): 5
Wind erodibility group (WEG): 6
Wind erodibility index (WEI): 48
Land capability subclass, non-irrigated: 4w
Land capability subclass, irrigated: 2w
Drainage class: well drained
Hydric soil class: no
Hydrologic group: C

Representative soil profile:	*Texture*	*Permeability*	*Available Water Capacity*	*pH*	*Kw*	*Kf*
H1 -- 0 to 6 in	loam	moderate	0.9 to 1.1 in	7.4 to 8.4	.28	.28
H2 -- 6 to 29 in	silty clay loam	slow	3.7 to 4.2 in	7.4 to 8.4	.24	.24
H3 -- 29 to 60 in	silt loam	moderate	4.9 to 5.5 in	7.4 to 8.4	.43	.43

Ecological Site / Plant Association: Loamy (R067BY002CO)
LOAMY PLAINS (067XY002CO_1)

Map Unit Description

Sand Creek Massacre National Historic Site, Colorado

Representative soil profile:		*Texture*	*Permeability*	*Available Water Capacity*	*pH*	*Kw*	*Kf*
H1 --	0 to 5 in	silt loam	moderate	0.8 to 1.0 in	7.4 to 8.4	.43	.43
H2 --	5 to 60 in	silt loam	moderate	10.4 to 11.5 in	7.9 to 8.4	.32	.32

Ecological Site / Plant Association: Loamy (R067BY002CO)

LOAMY PLAINS (067XY002CO_1)

6 - Bijou loamy sand, 0 to 2 percent slopes

Mean annual precipitation:
Mean annual temperature: 46 to 52 degrees F

Frost-free period: 140 to 180 days
Farmland class: Not prime farmland

Bijou and similar soils

Extent: about 90 percent of the unit
Landform(s): low-lying areas sand ramps
Slope gradient: 0 to 2 percent
Parent material: noncalcareous eolian sands
Restrictive feature(s): none
Seasonal high water table: greater than 60 inches
Flooding frequency none
Ponding frequency: none

Soil loss tolerance (T factor): 3
Wind erodibility group (WEG): 2
Wind erodibility index (WEI): 134
Land capability subclass, non-irrigated: 4e
Land capability subclass, irrigated: 4e
Drainage class: well drained
Hydric soil class: no
Hydrologic group: B

Representative soil profile:

		Texture	Permeability	Available Water Capacity	pH	Kw	Kf
H1 --	0 to 7 in	loamy sand	rapid	0.4 to 0.6 in	6.6 to 7.3	.20	.20
H2 --	7 to 24 in	sandy loam	moderately rapid	1.7 to 2.0 in	6.6 to 7.8	.20	.20
H3 --	24 to 60 in	sand	rapid	1.8 to 2.5 in	6.6 to 7.8	.15	.15

Ecological Site / Plant Association: DEEP SANDS (067XY015CO_2)
Sands (R067BY015CO)

10 - Colby silt loam, 1 to 3 percent slopes

Mean annual precipitation: 14 to 16 inches
Mean annual temperature: 52 to 54 degrees F
Frost-free period: 150 to 160 days
Farmland class: Prime farmland if irrigated

Colby and similar soils

Extent: about 85 percent of the unit
Landform(s): rolling upland plains
Slope gradient: 1 to 3 percent
Parent material: loess
Restrictive feature(s): none
Seasonal high water table: greater than 60 inches
Flooding frequency none
Ponding frequency: none

Soil loss tolerance (T factor): 5
Wind erodibility group (WEG): 4L
Wind erodibility index (WEI): 86
Land capability subclass, non-irrigated: 4e
Land capability subclass, irrigated: 3e
Drainage class: well drained
Hydric soil class: no
Hydrologic group: B

Representative soil profile:	*Texture*	*Permeability*	*Available Water Capacity*	*pH*	*Kw*	*Kf*
H1 -- 0 to 4 in	silt loam	moderate	0.6 to 0.8 in	7.4 to 8.4	.43	.43
H2 -- 4 to 60 in	silt loam	moderate	8.4 to 11.2 in	7.4 to 8.4	.43	.43

Ecological Site / Plant Association: Loamy (R067BY002CO)
LOAMY PLAINS (067XY002CO_1)

12 - Fluvaquents, nearly level*

Mean annual precipitation:
Mean annual temperature: 46 to 54 degrees F

Frost-free period: 80 to 175 days
Farmland class: Not prime farmland

Fluvaquents, nearly level and similar soils

Extent: about 85 percent of the unit
Landform(s): along Rush Creek & Big Sandy Creek flood
Slope gradient: 0 to 2 percent
Parent material: brown clay loam
Restrictive feature(s): none
Seasonal high water table: approximately 30 inches
Flooding frequency frequent
Ponding frequency: none

Soil loss tolerance (T factor): 3
Wind erodibility group (WEG): 8
Wind erodibility index (WEI): 0
Land capability subclass, non-irrigated: 7w
Land capability subclass, irrigated:
Drainage class: somewhat poorly drained
Hydric soil class: yes
Hydrologic group: D

Representative soil profile:

		Texture	Permeability	Available Water Capacity	pH	Kw	Kf
H1 --	0 to 10 in	variable	rapid		7.4 to 8.4		
H2 --	10 to 60 in	sr to clay loam to very gravelly sand	moderate	5.0 to 10.0 in	7.4 to 8.4	.10	.32

Ecological Site / Plant Association: Salt Meadow (R067BY035CO)

14 - Goshen silt loam

Mean annual precipitation:
Mean annual temperature: 50 to 54 degrees F

Frost-free period: 140 to 160 days
Farmland class: Prime farmland if irrigated

Goshen and similar soils

Extent: about 85 percent of the unit
Landform(s): upland drainageways
Slope gradient: 0 to 1 percent
Parent material: alluvium and/or loess
Restrictive feature(s): none
Seasonal high water table: greater than 60 inches
Flooding frequency occasional
Ponding frequency: none

Soil loss tolerance (T factor): 5
Wind erodibility group (WEG): 6
Wind erodibility index (WEI): 48
Land capability subclass, non-irrigated: 3c
Land capability subclass, irrigated: 1
Drainage class: well drained
Hydric soil class: no
Hydrologic group: B

Representative soil profile:	*Texture*	*Permeability*	*Available Water Capacity*	*pH*	*Kw*	*Kf*
H1 -- 0 to 5 in	silt loam	moderate	0.8 to 1.0 in	6.1 to 7.8	.37	.37
H2 -- 5 to 36 in	silty clay loam	moderate	5.2 to 6.8 in	6.6 to 8.4	.28	.28
H3 -- 36 to 60 in	silt loam	moderate	3.6 to 4.8 in	7.4 to 8.4	.37	.37

Ecological Site / Plant Association: Overflow (R072XY036CO)

17 - Keyner loamy sand, 0 to 2 percent slopes

Mean annual precipitation:

Mean annual temperature: 52 to 54 degrees F

Frost-free period: 150 to 170 days

Farmland class: Not prime farmland

Keyner and similar soils

Extent: about 85 percent of the unit

Landform(s): low-lying areas sand ramps

Slope gradient: 0 to 2 percent

Parent material: mixed eolian deposits derived from sedimentary rock

Restrictive feature(s): none

Seasonal high water table: greater than 60 inches

Flooding frequency none

Ponding frequency: none

Soil loss tolerance (T factor): 5

Wind erodibility group (WEG): 2

Wind erodibility index (WEI): 134

Land capability subclass, non-irrigated: 6s

Land capability subclass, irrigated:

Drainage class: well drained

Hydric soil class: no

Hydrologic group: D

Representative soil profile:

		Texture	Permeability	Available Water Capacity	pH	Kw	Kf
H1 --	0 to 11 in	loamy sand	rapid	0.6 to 0.8 in	7.4 to 9.0	.20	.20
H2 --	11 to 17 in	sandy clay loam	moderate	0.9 to 1.2 in	7.9 to 9.0	.24	.24
H3 --	17 to 60 in	sandy clay loam	moderate	5.1 to 6.9 in	8.5 to 9.6	.43	.43

Ecological Site / Plant Association: Sandy Salt Flat (R067XY032CO)

Stoneham and similar soils

Extent: about 25 percent of the unit
Landform(s):
Slope gradient: 1 to 2 percent
Parent material:
Restrictive feature(s): none
Seasonal high water table: greater than 60 inches
Flooding frequency none
Ponding frequency: none

Soil loss tolerance (T factor): 5
Wind erodibility group (WEG): 6
Wind erodibility index (WEI): 48
Land capability subclass, non-irrigated: 4e
Land capability subclass, irrigated: 2e
Drainage class: well drained
Hydric soil class: no
Hydrologic group: B

Representative soil profile:	*Texture*	*Permeability*	*Available Water Capacity*	*pH*	*Kw*	*Kf*
H1 -- 0 to 4 in	loam	moderate	0.6 to 0.7 in	6.6 to 7.8	.37	.37
H2 -- 4 to 13 in	clay loam	moderate	1.3 to 1.6 in	6.6 to 7.8	.24	.24
H3 -- 13 to 60 in	clay loam	moderate	6.6 to 8.4 in	7.9 to 8.4	.24	.24
H4 -- 60 to 64 in	sandy loam	moderately rapid	0.3 to 0.5 in	7.9 to 8.4	.17	.32

Ecological Site / Plant Association: Loamy (R067BY002CO)
LOAMY PLAINS (067XY002CO_1)

Representative soil profile:		*Texture*	*Permeability*	*Available Water Capacity*	*pH*	*Kw*	*Kf*
H1 --	0 to 4 in	loam	moderate	0.6 to 0.7 in	6.6 to 7.8	.37	.37
H2 --	4 to 13 in	clay loam	moderate	1.3 to 1.6 in	6.6 to 7.8	.24	.24
H3 --	13 to 60 in	clay loam	moderate	6.6 to 8.4 in	7.9 to 8.4	.24	.24
H4 --	60 to 64 in	sandy loam	moderately rapid	0.3 to 0.5 in	7.9 to 8.4	.17	.32

Ecological Site / Plant Association: Loamy (R067BY002CO)

LOAMY PLAINS (067XY002CO_1)

Larimer and similar soils

Extent: about 25 percent of the unit
Landform(s):
Slope gradient: 3 to 10 percent
Parent material:
Restrictive feature(s): none
Seasonal high water table: greater than 60 inches
Flooding frequency none
Ponding frequency: none

Soil loss tolerance (T factor): 3
Wind erodibility group (WEG): 6
Wind erodibility index (WEI): 48
Land capability subclass, non-irrigated: 4e
Land capability subclass, irrigated:
Drainage class: well drained
Hydric soil class: no
Hydrologic group: B

Representative soil profile:		*Texture*	*Permeability*	*Available Water Capacity*	*pH*	*Kw*	*Kf*
H1 --	0 to 3 in	loam	moderate	0.4 to 0.5 in	6.6 to 8.4	.28	.28
H2 --	3 to 11 in	loam	moderate	1.0 to 1.3 in	6.6 to 8.4	.37	.37
H3 --	11 to 28 in	sandy clay loam	moderately rapid	1.9 to 2.2 in	7.9 to 9.0	.20	.37
H4 --	28 to 60 in	very gravelly loamy sand	very rapid	1.0 to 1.6 in	7.9 to 8.4	.10	.28

Ecological Site / Plant Association: Loamy (R067BY002CO)

LOAMY PLAINS (067XY002CO_1)

27 - Olney loamy sand, 0 to 2 percent slopes

Mean annual precipitation:
Mean annual temperature: 46 to 54 degrees F
Frost-free period: 125 to 175 days
Farmland class: Not prime farmland

Olney and similar soils

Extent: about 85 percent of the unit
Landform(s): low-lying sand ramps
Slope gradient: 0 to 2 percent
Parent material: sandy alluvium and/or sandy eolian deposits
Restrictive feature(s): none
Seasonal high water table: greater than 60 inches
Flooding frequency none
Ponding frequency: none

Soil loss tolerance (T factor): 5
Wind erodibility group (WEG): 2
Wind erodibility index (WEI): 134
Land capability subclass, non-irrigated: 4e
Land capability subclass, irrigated: 3e
Drainage class: well drained
Hydric soil class: no
Hydrologic group: B

Representative soil profile:

		Texture	Permeability	Available Water Capacity	pH	Kw	Kf
H1 --	0 to 6 in	loamy sand	rapid	0.4 to 0.6 in	6.6 to 7.8	.15	.15
H2 --	6 to 27 in	sandy clay loam	moderate	2.8 to 3.6 in	6.6 to 7.8	.24	.24
H3 --	27 to 60 in	fine sandy loam	moderate	3.6 to 4.9 in	7.9 to 8.4	.24	.24
H4 --	60 to 64 in	fine sandy loam	moderately rapid	0.3 to 0.6 in	7.9 to 9.0	.32	.32

Ecological Site / Plant Association: Sandy (R067BY024CO)
SANDY PLAINS (067XY024CO_1)

30 - Richfield silt loam, 0 to 1 percent

Mean annual precipitation:
Mean annual temperature: 50 to 57 degrees F

Frost-free period: 140 to 185 days
Farmland class: Prime farmland if irrigated

Richfield and similar soils

Extent: about 85 percent of the unit
Landform(s): upland depressions
upland flats
Slope gradient: 0 to 1 percent
Parent material: loess
Restrictive feature(s): none
Seasonal high water table: greater than 60 inches
Flooding frequency none
Ponding frequency: none

Soil loss tolerance (T factor): 5
Wind erodibility group (WEG): 6
Wind erodibility index (WEI): 48
Land capability subclass, non-irrigated: 3c
Land capability subclass, irrigated: 1
Drainage class: well drained
Hydric soil class: no
Hydrologic group: B

Representative soil profile:

		Texture	Permeability	Available Water Capacity	pH	Kw	Kf
H1 --	0 to 7 in	silt loam	moderate	1.1 to 1.4 in	6.6 to 7.8	.37	.37
H2 --	7 to 22 in	silty clay loam	moderately slow	2.5 to 3.1 in	6.6 to 8.4	.28	.28
H3 --	22 to 60 in	silt loam	moderate	5.7 to 7.6 in	7.4 to 8.4	.43	.43

Ecological Site / Plant Association: LOAMY PLAINS (072XY001CO_1)
Loamy Plains (R072XY001CO)

Map Unit Description

Sand Creek Massacre National Historic Site, Colorado

Representative soil profile:		*Texture*	*Permeability*	*Available Water Capacity*	*pH*	*Kw*	*Kf*
H1 --	0 to 6 in	clay loam	moderately slow	1.0 to 1.2 in	7.9 to 8.4	.24	.24
H2 --	6 to 25 in	clay loam	moderately slow	2.3 to 2.9 in	7.9 to 8.4	.32	.32
H3 --	25 to 29 in	weathered bedrock	moderate				

Ecological Site / Plant Association: ALKALINE PLAINS (069XY047CO_1)

Alkaline Plains (R069XY047CO)

35 - Sundance loamy sand

Mean annual precipitation:
Mean annual temperature: 46 to 52 degrees F

Frost-free period: 150 to 150 days
Farmland class: Not prime farmland

Sundance and similar soils

Extent: about 85 percent of the unit
Landform(s): upland plains
Slope gradient: 0 to 2 percent
Parent material: eolian sands over older, hardland loess
Restrictive feature(s): none
Seasonal high water table: greater than 60 inches
Flooding frequency none
Ponding frequency: none

Soil loss tolerance (T factor): 5
Wind erodibility group (WEG): 2
Wind erodibility index (WEI): 134
Land capability subclass, non-irrigated: 4e
Land capability subclass, irrigated: 4e
Drainage class: well drained
Hydric soil class: no
Hydrologic group: B

Representative soil profile:	*Texture*	*Permeability*	*Available Water Capacity*	*pH*	*Kw*	*Kf*
H1 -- 0 to 8 in	loamy sand	rapid	0.5 to 0.6 in	6.6 to 7.3	.20	.20
H2 -- 8 to 17 in	sandy loam	moderate	0.9 to 1.2 in	6.6 to 7.3	.24	.24
H3 -- 17 to 28 in	clay loam	moderately slow	1.8 to 2.0 in	7.4 to 8.4	.32	.32
H4 -- 28 to 60 in	silt loam	moderate	5.1 to 5.7 in	7.9 to 8.4	.43	.43

Ecological Site / Plant Association: Sandy (R067BY024CO)
SANDY PLAINS (067XY024CO_1)

38 - Valent-Blownout land complex, 2 to 8 percent slopes

Mean annual precipitation:
Mean annual temperature: 48 to 52 degrees F
Frost-free period: 130 to 180 days
Farmland class: Not prime farmland

Valent and similar soils

Extent: about 40 percent of the unit
Landform(s):
Slope gradient: 2 to 8 percent
Parent material:
Restrictive feature(s): none
Seasonal high water table: greater than 60 inches
Flooding frequency none
Ponding frequency: none

Soil loss tolerance (T factor): 5
Wind erodibility group (WEG): 1
Wind erodibility index (WEI): 220
Land capability subclass, non-irrigated: 6e
Land capability subclass, irrigated: 4e
Drainage class: excessively drained
Hydric soil class: no
Hydrologic group: A

Representative soil profile:	*Texture*	*Permeability*	*Available Water Capacity*	*pH*	*Kw*	*Kf*
H1 -- 0 to 5 in		very rapid	0.3 to 0.4 in	6.6 to 7.8	.17	.17
H2 -- 5 to 60 in		rapid	2.7 to 5.5 in	6.6 to 7.8	.10	.10
H3 -- 60 to 64 in		rapid	0.1 to 0.2 in	6.6 to 7.8	.10	.10

Ecological Site / Plant Association: DEEP SANDS (067XY015CO_2)
Sands (R067BY015CO)

Blownout land

Extent: about 40 percent of the unit
Landform(s): severely eroded by soil-blowing sand ramps
Slope gradient:
Parent material: noncalcareous eolian sands
Restrictive feature(s): none
Seasonal high water table: greater than 60 inches
Flooding frequency none
Ponding frequency: none

Soil loss tolerance (T factor):
Wind erodibility group (WEG):
Wind erodibility index (WEI):
Land capability subclass, non-irrigated:
Land capability subclass, irrigated:
Drainage class:
Hydric soil class: no
Hydrologic group:

Representative soil profile:	*Texture*	*Permeability*	*Available Water Capacity*	*pH*	*Kw*	*Kf*
none						

Ecological Site / Plant Association:

Rangeland Productivity and Plant Composition

Sand Creek Massacre National Historic Site, Colorado

[Only the soils that support rangeland vegetation suitable for grazing are rated]

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/ac	*Lb/ac*	*Lb/ac*		*Pct*
3:						
Baca	Loamy	1,800	1,200	800	Western wheatgrass	15
					Galleta	10
					Bottlebrush squirreltail	5
4:						
Baca	Loamy	1,500	750	300	Galleta	10
					Western wheatgrass	10
Wiley	Loamy	1,200	800	300	Western wheatgrass	15
					Galleta	10
					Sand dropseed	5
5:						
Bankard	Sandy Bottomland	1,500	1,200	800	Prairie sandreed	15
					Sand dropseed	15
					Needleandthread	10
					Sand bluestem	10
					Sand sagebrush	10
					Switchgrass	10
					Western wheatgrass	5
Glenberg	Sandy Bottomland	2,000	1,600	800	Prairie sandreed	15
					Needlegrass	10
					Sand bluestem	10
					Sand dropseed	10
					Switchgrass	10
					Sand sagebrush	5
					Thickspick wheatgrass	5

Rangeland Productivity and Plant Composition

Sand Creek Massacre National Historic Site, Colorado

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/ac	*Lb/ac*	*Lb/ac*		*Pct*
10:						
Colby	Loamy	1,600	1,200	800	Little bluestem	25
					Sideoats grama	15
					Western wheatgrass	10
					Needleandthread	5
					Small soapweed	5
11:						
Colby	Loamy	1,600	1,200	800	Little bluestem	25
					Sideoats grama	15
					Western wheatgrass	10
					Needleandthread	5
					Small soapweed	5
12:						
Fluvaquents, nearly level	Salt Meadow	2,500	2,000	1,500	Rush	10
					Willow	10
					Narrowleaf cottonwood	5
13:						
Fort Collins	Sandy	1,500	1,100	600	Sideoats grama	15
					Western wheatgrass	13
					Sand dropseed	10
					Needleandthread	5
					Truckee rabbitbrush	5

Rangeland Productivity and Plant Composition

Sand Creek Massacre National Historic Site, Colorado

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/ac	*Lb/ac*	*Lb/ac*		*Pct*
21:						
Stoneham	Loamy	1,300	800	500	Western wheatgrass	10
					Needleandthread	5
					Sand dropseed	5
					Sideoats grama	5
22:						
Kim	Loamy	1,600	1,000	500	Western wheatgrass	30
					Green needlegrass	10
					Needleandthread	5
					Sand dropseed	5
Stoneham	Loamy	1,300	800	500	Western wheatgrass	10
					Needleandthread	5
					Sand dropseed	5
					Sideoats grama	5
Larimer	Loamy	1,200	800	500	Western wheatgrass	10
					Bottlebrush squirreltail	5
					Needleandthread	5
					Sand dropseed	5
24:						
Manzanola	Saline Overflow	2,500	1,500	750	Western wheatgrass	25
					Fourwing saltbush	5
					Galleta	5
					Needleandthread	3

Rangeland Productivity and Plant Composition

Sand Creek Massacre National Historic Site, Colorado

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition
		Favorable year	Normal year	Unfavorable year		
		Lb/ac	*Lb/ac*	*Lb/ac*		*Pct*
33:						
Stoneham	Loamy	1,600	1,200	900	Western wheatgrass	25
					Green needlegrass	15
					Other perennial grasses	5
					Sideoats grama	5
35:						
Sundance	Sandy	1,800	1,600	800	Prairie sandreed	25
					Little bluestem	10
					Sand dropseed	10
					Sideoats grama	10
					Needleandthread	5
					Sand sagebrush	5
					Thickspick wheatgrass	5
37:						
Valent	Sands	2,000	1,200	800	Prairie sandreed	15
					Sand bluestem	15
					Sand sagebrush	15
					Sand dropseed	10
					Indian ricegrass	5
					Little bluestem	5
					Needlegrass	5
					Sandhill muhly	5
					Sideoats grama	5
					Switchgrass	5
					Thickspick wheatgrass	5
38:						
Blownout land	---	---	---	---	---	---

Rangeland Productivity and Plant Composition

In areas that have similar climate and topography, differences in the kind and amount of rangeland or forest understory vegetation are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

This table shows, for each soil that supports vegetation suitable for grazing, the ecological site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. An explanation of the column headings in the table follows.

An "ecological site" is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. Descriptions of ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service (NRCS).

"Total dry-weight production" is the amount of vegetation that can be expected to grow annually in a well managed area that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

"Characteristic vegetation" (the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil) is listed by common name. Under "rangeland composition," the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend. Range similarity index is determined by comparing the present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in the "National Range and Pasture Handbook," which is available in local offices of NRCS or on the Internet.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, an area with a range similarity index somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. (http://www.nrcs.usda.gov/technical/range.html)

Physical Soil Properties

Sand Creek Massacre National Historic Site, Colorado

[Entries under "Erosion Factors--T" apply to the entire profile. Entries under "Wind Erodibility Group" and "Wind Erodibility Index" apply only to the surface layer. Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
3:														
Baca	0-6	---	---	20-25	1.25-1.40	4.23-14.11	0.16-0.18	0.0-2.9	1.0-3.0	.28	.28	5	6	48
	6-29	---	---	35-45	1.15-1.40	0.42-1.41	0.16-0.18	3.0-5.9	0.5-1.0	.24	.24			
	29-60	---	---	15-25	1.15-1.30	4.23-14.11	0.16-0.18	0.0-2.9	0.5-1.0	.43	.43			
4:														
Baca	0-4	---	---	28-35	1.25-1.35	4.23-14.11	0.16-0.20	3.0-5.9	1.0-2.0	.20	.20	5	6	48
	4-25	---	---	35-45	1.35-1.40	1.41-4.23	0.16-0.18	3.0-5.9	0.5-2.0	.32	.32			
	25-60	---	---	15-30	1.35-1.45	4.23-14.11	0.16-0.18	0.0-2.9	0.0-0.5	.37	.37			
Wiley	0-5	---	---	15-27	1.15-1.30	4.23-14.11	0.15-0.20	0.0-2.9	0.5-1.0	.43	.43	5	4L	86
	5-60	---	---	18-35	1.15-1.30	4.23-14.11	0.19-0.21	3.0-5.9	0.0-0.5	.32	.32			
5:														
Bankard	0-4	---	---	2-10	1.45-1.60	42.00-141.00	0.08-0.11	0.0-2.9	0.5-1.0	.28	.28	5	2	134
	4-60	---	---	2-10	1.35-1.60	42.00-141.00	0.05-0.11	0.0-2.9	0.0-0.5	.28	.28			
Glenberg	0-5	---	---	10-20	1.45-1.50	14.11-42.33	0.13-0.15	0.0-2.9	0.5-1.0	.28	.28	5	3	86
	5-60	---	---	8-18	1.45-1.50	14.11-42.33	0.07-0.12	0.0-2.9	0.5-1.0	.28	.28			
6:														
Bijou	0-7	---	---	4-10	1.45-1.60	42.00-141.00	0.06-0.08	0.0-2.9	0.5-1.0	.20	.20	3	2	134
	7-24	---	---	12-18	1.45-1.55	14.11-42.33	0.10-0.12	0.0-2.9	0.0-0.5	.20	.20			
	24-60	---	---	2-10	1.50-1.65	42.00-141.00	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
7:														
Bijou	0-7	---	---	4-10	1.45-1.60	42.00-141.00	0.06-0.08	0.0-2.9	0.5-1.0	.20	.20	3	2	134
	7-24	---	---	12-18	1.45-1.55	14.11-42.33	0.10-0.12	0.0-2.9	0.0-0.5	.20	.20			
	24-60	---	---	2-10	1.50-1.65	42.00-141.00	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			

Physical Soil Properties

Sand Creek Massacre National Historic Site, Colorado

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
17:														
Keyner	0-11	---	---	3-8	1.45-1.60	42.00-141.00	0.05-0.07	0.0-2.9	0.5-1.0	.20	.20	5	2	134
	11-17	---	---	20-35	1.25-1.35	1.41-14.11	0.15-0.20	3.0-5.9	0.0-0.5	.24	.24			
	17-60	---	---	15-25	1.40-1.50	4.23-14.11	0.12-0.16	0.0-2.9	0.0-0.5	.43	.43			
21:														
Kim	0-4	---	---	15-27	1.25-1.40	4.23-14.11	0.14-0.18	0.0-2.9	0.5-1.0	.37	.37	5	4L	86
	4-60	---	---	20-35	1.30-1.40	4.23-14.11	0.15-0.17	0.0-2.9	0.0-0.5	.37	.37			
Harvey	0-5	---	---	15-25	1.25-1.40	4.23-14.11	0.13-0.16	0.0-2.9	1.0-2.0	.28	.28	5	4L	86
	5-50	---	---	18-35	1.40-1.50	4.23-14.11	0.14-0.18	0.0-2.9	0.0-0.5	.37	.37			
	50-60	---	---	10-25	1.35-1.50	4.23-14.11	0.07-0.10	0.0-2.9	0.0-0.5	.15	.28			
Stoneham	0-4	---	---	15-27	1.25-1.40	4.23-14.11	0.16-0.18	0.0-2.9	0.5-2.0	.37	.37	5	6	48
	4-13	---	---	20-35	1.40-1.45	4.23-14.11	0.14-0.18	3.0-5.9	0.5-1.0	.24	.24			
	13-60	---	---	20-35	1.40-1.45	4.23-14.11	0.14-0.18	3.0-5.9	0.5-1.0	.24	.24			
	60-64	---	---	10-20	1.45-1.55	14.11-42.33	0.08-0.12	0.0-2.9	0.0-0.5	.17	.32			
22:														
Kim	0-4	---	---	15-27	1.25-1.40	4.23-14.11	0.14-0.18	0.0-2.9	0.5-1.0	.37	.37	5	4L	86
	4-60	---	---	20-35	1.30-1.40	4.23-14.11	0.15-0.17	0.0-2.9	0.0-0.5	.37	.37			
Stoneham	0-4	---	---	15-27	1.25-1.40	4.23-14.11	0.16-0.18	0.0-2.9	0.5-2.0	.37	.37	5	6	48
	4-13	---	---	20-35	1.40-1.45	4.23-14.11	0.14-0.18	3.0-5.9	0.5-1.0	.24	.24			
	13-60	---	---	20-35	1.40-1.45	4.23-14.11	0.14-0.18	3.0-5.9	0.5-1.0	.24	.24			
	60-64	---	---	10-20	1.45-1.55	14.11-42.33	0.08-0.12	0.0-2.9	0.0-0.5	.17	.32			
Larimer	0-3	---	---	15-27	1.25-1.40	4.23-14.11	0.14-0.17	0.0-2.9	2.0-3.0	.28	.28	3	6	48
	3-11	---	---	15-27	1.25-1.40	4.23-14.11	0.13-0.16	0.0-2.9	0.5-1.0	.37	.37			
	11-28	---	---	15-25	1.25-1.40	14.11-42.33	0.11-0.13	0.0-2.9	0.5-1.0	.20	.37			
	28-60	---	---	0-5	1.30-1.50	141.00	0.03-0.05	0.0-2.9	0.0-0.5	.10	.28			

Physical Soil Properties

Sand Creek Massacre National Historic Site, Colorado

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
33:														
Stoneham	0-4	---	---	15-27	1.25-1.40	4.23-14.11	0.16-0.18	0.0-2.9	0.5-2.0	.37	.37	5	6	48
	4-13	---	---	20-35	1.40-1.45	4.23-14.11	0.14-0.18	3.0-5.9	0.5-1.0	.24	.24			
	13-60	---	---	20-35	1.40-1.45	4.23-14.11	0.14-0.18	3.0-5.9	0.5-1.0	.24	.24			
	60-64	---	---	10-20	1.45-1.55	14.11-42.33	0.08-0.12	0.0-2.9	0.0-0.5	.17	.32			
35:														
Sundance	0-8	---	---	5-10	1.50-1.60	42.00-141.00	0.06-0.08	0.0-2.9	0.5-1.0	.20	.20	5	2	134
	8-17	---	---	15-25	1.45-1.55	4.23-14.11	0.10-0.13	0.0-2.9	0.5-1.0	.24	.24			
	17-28	---	---	27-35	1.40-1.50	1.41-4.23	0.16-0.18	3.0-5.9	0.5-1.0	.32	.32			
	28-60	---	---	10-25	1.30-1.40	4.23-14.11	0.16-0.18	3.0-5.9	0.0-0.5	.43	.43			
37:														
Valent	0-5	---	---	3-10	1.50-1.60	42.00-141.00	0.07-0.12	0.0-2.9	0.5-1.0	.24	.24	5	2	134
	5-60	---	---	2-8	1.55-1.65	42.00-141.00	0.05-0.10	0.0-2.9	0.0-0.5	.10	.10			
	60-64	---	---	2-6	1.55-1.65	42.00-141.00	0.03-0.05	0.0-2.9	0.0-0.5	.10	.10			
38:														
Blownout land	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Valent	0-5	---	---	2-6	1.45-1.60	141.00	0.05-0.08	0.0-2.9	0.5-1.0	.17	.17	5	1	220
	5-60	---	---	2-8	1.55-1.65	42.00-141.00	0.05-0.10	0.0-2.9	0.0-0.5	.10	.10			
	60-64	---	---	2-6	1.55-1.65	42.00-141.00	0.03-0.05	0.0-2.9	0.0-0.5	.10	.10			
41:														
Wiley	0-5	---	---	15-27	1.25-1.40	4.23-14.11	0.14-0.18	0.0-2.9	0.5-1.0	.37	.37	5	4L	86
	5-16	---	---	18-35	1.15-1.30	4.23-14.11	0.19-0.21	3.0-5.9	0.0-0.5	.32	.32			
	16-60	---	---	18-35	1.15-1.40	4.23-14.11	0.16-0.21	0.0-2.9	0.0-0.5	.37	.37			

Chemical Soil Properties

Sand Creek Massacre National Historic Site, Colorado

[Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100 g*	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
3:								
Baca	0-6	15-25	---	7.4 - 8.4	0	0	0.0	0
	6-29	20-40	---	7.4 - 8.4	0-10	0	0.0-2.0	0
	29-60	5.0-15	---	7.4 - 8.4	0-5	0	0.0-2.0	0
4:								
Baca	0-4	15-25	---	6.6 - 8.4	0	0	0.0	0
	4-25	15-30	---	6.6 - 8.4	0-5	0	0.0-2.0	0
	25-60	5.0-20	---	7.9 - 9.0	1-15	0-3	0.0-2.0	0
Wiley	0-5	5.0-20	---	7.4 - 8.4	0-10	0	0.0	0
	5-60	10-20	---	7.9 - 8.4	5-10	0	0.0	0
5:								
Bankard	0-4	0.0-10	---	7.4 - 8.4	0-10	0	0.0	0
	4-60	0.0-10	---	7.4 - 8.4	0-10	0	0.0-2.0	0
Glenberg	0-5	5.0-15	---	7.4 - 8.4	0-5	0	0.0	0
	5-60	3.0-15	---	7.4 - 9.0	1-10	0	0.0-2.0	0
6:								
Bijou	0-7	1.0-10	---	6.6 - 7.3	0	0	0.0	0
	7-24	5.0-15	---	6.6 - 7.8	0	0	0.0	0
	24-60	1.0-10	---	6.6 - 7.8	0-5	0	0.0	0
7:								
Bijou	0-7	1.0-10	---	6.6 - 7.3	0	0	0.0	0
	7-24	5.0-15	---	6.6 - 7.8	0	0	0.0	0
	24-60	1.0-10	---	6.6 - 7.8	0-5	0	0.0	0
Valent	0-5	5.0-10	---	6.6 - 7.8	0	0	0.0	0
	5-60	1.0-5.0	---	6.6 - 7.8	0	0	0.0	0
	60-64	1.0-5.0	---	6.6 - 7.8	0	0	0.0	0
10:								
Colby	0-4	5.0-20	---	7.4 - 8.4	1-10	0	0.0	0
	4-60	5.0-20	---	7.4 - 8.4	1-10	0	0.0	0
11:								
Colby	0-4	5.0-20	---	7.4 - 8.4	1-10	0	0.0	0
	4-60	5.0-20	---	7.4 - 8.4	1-10	0	0.0	0
12:								
Fluvaquents, nearly level	0-10	2.0-25	---	7.4 - 8.4	0	0	0.0-8.0	0
	10-60	2.0-20	---	7.4 - 8.4	0	0	0.0-8.0	0

Chemical Soil Properties

Sand Creek Massacre National Historic Site, Colorado

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100 g*	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
24:								
Manzanola	0-6	20-35	---	7.4 - 8.4	1-2	0	0.0-4.0	0
	6-32	25-40	---	7.4 - 8.4	1-5	0	0.0-2.0	5-15
	32-60	20-30	---	7.4 - 9.0	1-5	1-3	0.0-8.0	5-15
27:								
Olney	0-6	2.0-10	---	6.6 - 7.8	0	0	0.0	0
	6-27	10-25	---	6.6 - 7.8	0-10	0	0.0	0
	27-60	10-20	---	7.9 - 8.4	0-10	0	0.0-2.0	0
	60-64	3.0-10	---	7.9 - 9.0	5-15	0	0.0-2.0	0
29:								
Playas	0-2	25-50	---	6.6 - 7.8	2-5	1-5	0.0-4.0	0
	2-60	20-50	---	7.4 - 9.0	5-15	1-5	0.0-8.0	0
30:								
Richfield	0-7	10-20	---	6.6 - 7.8	0	0	0.0	0
	7-22	20-35	---	6.6 - 8.4	0-5	0	0.0	0
	22-60	5.0-15	---	7.4 - 8.4	5-15	0	0.0	0
32:								
Singerton	0-6	5.0-20	---	7.4 - 8.4	5-20	0-1	0.0-4.0	0
	6-60	5.0-20	---	7.9 - 8.4	10-45	2-15	0.0-8.0	0
Pultney	0-6	15-25	---	7.9 - 8.4	1-5	0	2.0-8.0	0
	6-25	10-25	---	7.9 - 8.4	15-25	0-5	4.0-16.0	0
	25-29	---	---	---	---	---	---	---
33:								
Stoneham	0-4	5.0-20	---	6.6 - 7.8	0-2	0	0.0	0
	4-13	5.0-20	---	6.6 - 7.8	0-5	0	0.0	0
	13-60	5.0-20	---	7.9 - 8.4	2-15	0	0.0-2.0	0
	60-64	5.0-15	---	7.9 - 8.4	2-15	0	0.0-2.0	0
35:								
Sundance	0-8	3.0-10	---	6.6 - 7.3	0	0	0.0	0
	8-17	10-20	---	6.6 - 7.3	0-5	0	0.0	0
	17-28	10-25	---	7.4 - 8.4	1-15	0	0.0-2.0	0
	28-60	10-20	---	7.9 - 8.4	1-15	0	0.0-2.0	0
37:								
Valent	0-5	5.0-10	---	6.6 - 7.8	0	0	0.0	0
	5-60	1.0-5.0	---	6.6 - 7.8	0	0	0.0	0
	60-64	1.0-5.0	---	6.6 - 7.8	0	0	0.0	0

Water Features

Sand Creek Massacre National Historic Site, Colorado

[Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydrologic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*	*Ft*				
3:										
Baca	C	High	Jan-Dec			---	---	None	---	None
4:										
Baca	B	Medium	Jan-Dec			---	---	None	---	None
Wiley	B	Low	Jan-Dec			---	---	None	---	None
5:										
Bankard	A	Negligible	March	---	---	---	---	None	Brief	Frequent
			April	---	---	---	---	None	Brief	Frequent
			May	---	---	---	---	None	Brief	Frequent
			June	---	---	---	---	None	Brief	Frequent
Glenberg	B	Very low	Jan-Dec			---	---	None	---	None
6:										
Bijou	B	Very low	Jan-Dec			---	---	None	---	None
7:										
Bijou	B	Very low	Jan-Dec			---	---	None	---	None
Valent	A	Very low	Jan-Dec			---	---	None	---	None
10:										
Colby	B	Low	Jan-Dec			---	---	None	---	None
11:										
Colby	B	Medium	Jan-Dec			---	---	None	---	None

Water Features

Sand Creek Massacre National Historic Site, Colorado

Map symbol and soil name	Hydrologic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*	*Ft*				
21:										
Kim	B	Low	Jan-Dec			---	---	None	---	None
Harvey	B	Low	Jan-Dec			---	---	None	---	None
Stoneham	B	Low	Jan-Dec			---	---	None	---	None
22:										
Kim	B	Medium	Jan-Dec			---	---	None	---	None
Stoneham	B	Low	Jan-Dec			---	---	None	---	None
Larimer	B	Medium	Jan-Dec			---	---	None	---	None
24:										
Manzanola	C	High	Jan-Dec			---	---	None	---	None
27:										
Olney	B	Low	Jan-Dec			---	---	None	---	None

Water Features

Sand Creek Massacre National Historic Site, Colorado

Map symbol and soil name	Hydrologic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*	*Ft*				
38:										
Blownout land	---	Low	Jan-Dec			---	---	None	---	None
Valent	A	Very low	Jan-Dec			---	---	None	---	None
41:										
Wiley	B	Low	Jan-Dec			---	---	None	---	None