

21. Osha Ecological Series

Table 21-1. Full and short names for the ecological types in the Osha Ecological Series.			
Ecological Type Code	Name	Plant Association Code	Short Name
GA07	Osha/meadow-rue-Very deep Smectitic Cryoboralfs, not coarse on surface-Linear to concave slumps and earthflows, > 9,000 ft	LIPO/THFE	Osha-Very deep heavy-clay soils

This is the *Ligusticum porteri* series of Hess and Wasser (1982). It includes the *Veratrum tenuipetalum* series of Komárková (1986).

Vegetation, Climate, Soils

This type has the shortest successional period (sere) in the UGB. Under secondary succession, recovery often occurs within 5-10 years after disturbance. Stands occupy small- to medium-sized sites, which are often isodiametric in shape, or occur as patches within a Thurber fescue grassland or mountain big sagebrush/ Thurber fescue shrubland. The patches of osha correspond to patches of heavy-clay soil that limit growth of bunchgrasses.

Most water runs off these dense-clay soils, but some may percolate into the subsoil.

Total live vegetation production ranges from 800 lb/ac/yr on sites in poor condition, to 2,000 lb/ac/yr on sites in excellent condition. Grass production ranges from 150 lb/ac/yr on sites in poor condition, to 400 lb/ac/yr on sites in excellent condition (Turner 1951).

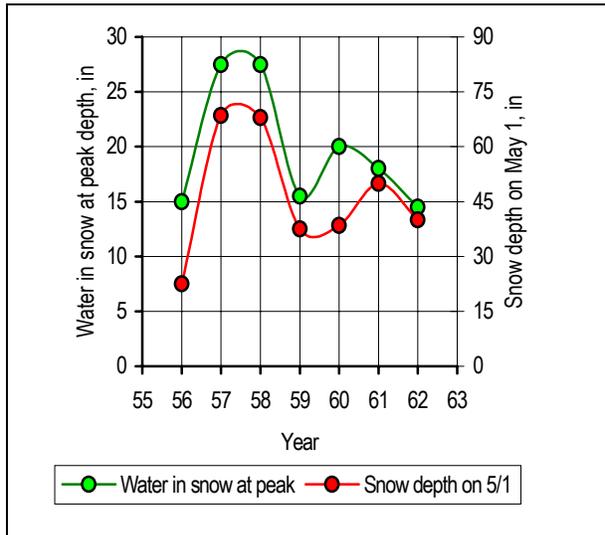


Fig. 21-1. Snow depth and water content of snow on Grand Mesa, Colorado (Hansen and Ward 1966).

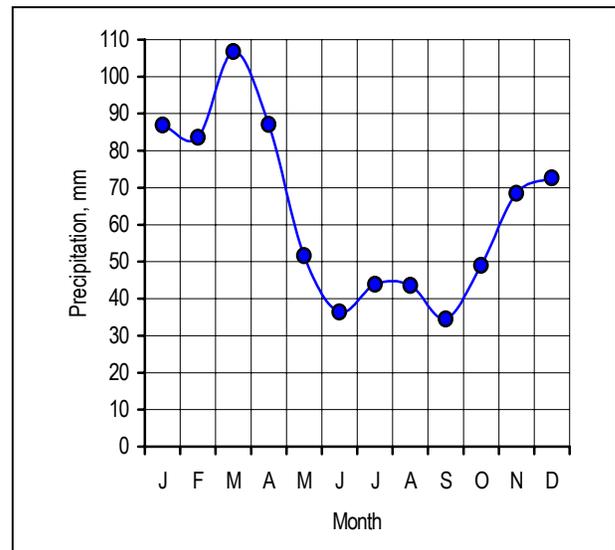


Fig. 21-2. 34-year average precipitation at several osha sites in north-central Utah. Total precipitation is 764.8 mm/yr = 30.1 in/yr (Ellison 1954)

Table 21-2. Climate and Soils		
Characteristic	Value	Reference
Precipitation zone	760 mm/yr (710-820 mm/yr) 30 in/yr (28-32 in/yr) About two thirds of this falls as snow during the winter months, November-April	Ellison 1954, Hansen and Ward 1966, Turner 1969

Range and Wildlife Management

Common increasers with grazing use include orange sneezeweed (DUHO), dandelion (TAOF), mule's ears (WYETH), silvery lupine (LUAR3), and yarrow (ACLA5). Common decreaseers with grazing use include osha (LIPO), nodding helianthella (HEQU2), aspen peavine (LALE2), and meadow-rue (THFE).

Treatment	lb / a c / yr	
	1941	1960
Graminoids, Ungrazed	130	353
Graminoids, Grazed	124	300
Forbs, Ungrazed	600	440
Forbs, Grazed	130	353
Total, Ungrazed	740	801
Total, Grazed	706	763

Pocket gophers (*Thomomys talpoides*) are often active in disturbed sites or microsites. Pocket gophers become more active with increased disturbance, such as baring of soil by livestock grazing (Ellison and Aldous 1952). Pocket gophers eat the underground parts of plants, mostly forbs such as fleabane, geranium, and hairy golden aster (Keith and others 1959). Removal of pocket gophers from an overgrazed area changes vegetation production little, although dandelion decreases where gophers are present, and grasses, sedges, and rhizomatous species increase where gophers are present.

Pocket gophers may benefit such overgrazed sites by loosening the soil and increasing infiltration (Ellison and Aldous 1952). Pocket gophers also use adjacent Thurber fescue and aspen sites (McDonough 1974). Where pocket gophers are controlled by trapping, total aboveground plant production and forage both increase (Turner 1969). Spraying with 2,4-D reduces pocket gopher populations, increases grass production, and decreases forb production (Keith and others 1959).

Pocket gophers prefer dandelion, yarrow, lupine, and needlegrass species (Hansen and Ward 1966), all of which are increasers, characteristic of early-seral conditions in these sites. Hansen and Ward (1966) found that water content of the snow at peak snowpack and the depth of snow on May 1 are the most important factors influencing pocket gopher densities.

Life Form and Seral Stage ¹	Production, kg/ha/yr	
	Grazed by Sheep	Ungrazed
Graminoids-Late Seral	172.5	36.0
Forbs-Late Seral	0.8	1579.0
Total-Late Seral	173.3	1615.0
Graminoids-Midseral	913.0	429.0
Forbs-Midseral	114.0	686.0
Total-Midseral	1027.0	1115.0
Forbs-Early Seral	278.0	39.7
Grand Total	1478.3	2769.7

1. *Graminoids-Late Seral* include slender wheatgrass, mountain brome, and oniongrass (*Melica*). *Forbs-Late Seral* include osha, geranium, agoseris, vetch, peavine, and penstemon spp. *Graminoids-Midseral* include Kentucky bluegrass, and Letterman needlegrass. *Forbs-Midseral* include goldeneye (*Heliomeris multiflora*), Louisiana sagewort, aster, wild tarragon, fleabane, low larkspur, goldenrod, and yarrow. *Forbs-Early Seral* include starwort (*Stellaria*), Douglas knotweed, collomia, tarweed, and salsify. There are no Early Seral Graminoids.

Recreation, Roads & Trails, Scenery

Sites are unsuitable for roads and trails because of the clay soils that have a high potential for mass movement and slumping. However, roads and trails can be easily relocated away from these small sites. These sites are also unsuitable and unattractive for developed or dispersed recreation.

Revegetation and Rehabilitation

Revegetation is difficult despite the high precipitation these sites receive. Most disturbances, such as grazing, roads and trails, and gullies expose bare soil that persists for a very long time. Natural revegetation is very slow, and artificial revegetation requires plants adapted to heavy clay soils.

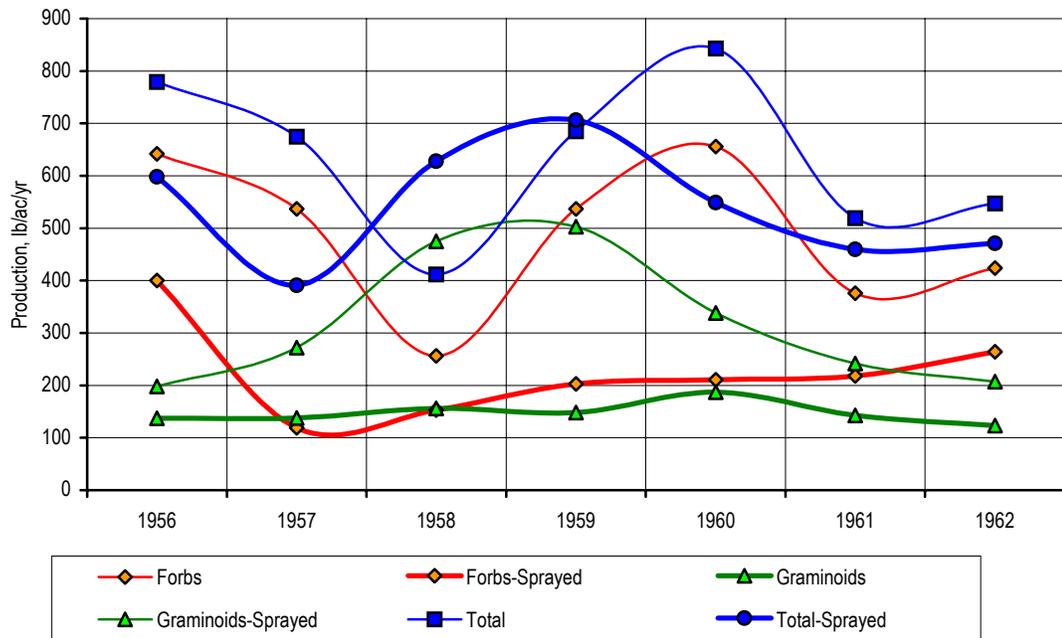


Fig. 21-3. Total aboveground herbage production from an osha site on Grand Mesa in central-western Colorado, depleted by long-term grazing, before and after spraying with 2,4-D (Hansen and Ward 1966).

Code Short Name	No. Samples	Elevation, ft	Avg. Aspect, °M (r) Slope, %	Soil Coarse, %	Depth, cm Mollic, cm	Surface: Coarse, % Bare, %	Cover, %: Trees Shrubs Graminoids Forbs	Total Live Cover, % No. Species TLC/NS, %
GA07 Osha-Very deep heavy-clay soils	6	9,752 (9,100-10,100)	89 (0.70) 24 (5-40)	16 (4-25)	89 (65-111) 49 (3-78)	5 (1-10) 17 (2-27)	0 (0-0) 3 (0-16) 56 (3-114) 145 (69-203)	203.5 (124.5-282.5) 24 (20-32) 8.5 (5.7-11.3)

OSHA–VERY DEEP HEAVY-CLAY SOILS

Osha/meadow-rue–Very deep Smectitic Cryoboralfs, not coarse on surface–
Linear to concave slumps and earthflows, > 9,000 ft

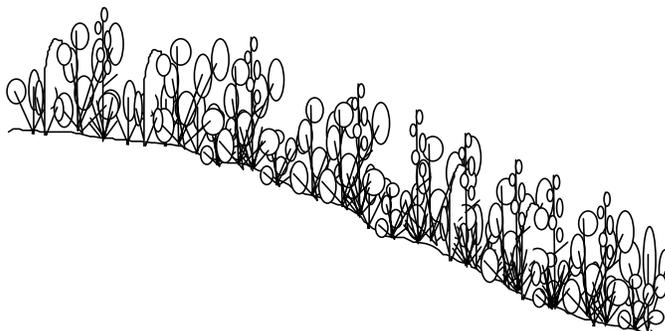


Figure 21-4. Cross-section of vegetation structure of *Osha–Very deep heavy-clay soils*. Aspects are easterly, and slope angles average 24%.

Osha–Very deep heavy-clay soils is a common type in middle to upper Subalpine swales and parks, with deep, heavy-clay soils outside the deep rainshadows. It occurs on slumps, flats, and benches in the northern part of the Gunnison Basin. This type has also been described from other areas in western Colorado and from eastern Utah. *Osha–Very deep heavy-clay soils* is characterized by a stand of dense forbs, such as osha (LIPO), nodding helianthella (HEQU2), aspen peavine (LALE2), Oregon fleabane (ERSP4), or meadow-rue (THFE). Fescue species are absent or minor, with <5% cover each; the only common grass is slender wheatgrass (ELTR7), which is not very palatable to grazing animals. See Table 21-9 for common species names and codes. Other distinguishing features include Smectitic Cryoboralf soils which are not skeletal, and are very poorly-drained to poorly-drained.

Osha–Very deep heavy-clay soils is related to *Thurber fescue/moist forbs–Deep dark clay soils–Linear or concave slopes*, which occurs on coarser soils, sometimes on southerly aspects, and is conspicuously dominated by Thurber fescue (FETH). *Osha–Very deep heavy-clay soils* is also related to *Aspen/meadow-rue-peavine–Deep dark clay soils*, a forested type that occurs on shallower, coarser soils, and is dominated by aspen (POTR5).

The plant association *Ligusticum porteri/Thalictrum fendleri* is a new name for *Ligusticum porteri/Vicia americana-Lathyrus leucanthus*, first documented by Hess (1982).

Primary and secondary succession are very similar and remarkably short, lasting at most several decades. Some sites recover from light disturbance in three to five years. These sites are relatively productive, but support no palatable bunchgrasses. The forage available for cattle is succulent, palatable forbs such as osha and meadow-rue. When sites are overgrazed, the unpalatable native pest, mule's ears (WYMA), may invade, and is very difficult to eradicate once it has established. Moderately-heavy to heavy grazing by cattle, sheep, deer, or elk tends to decrease osha, meadow-rue, peavine, vetch, and other palatable forbs; mule's ears and other unpalatables increase.

Thurber fescue/meadow-rue communities occur on adjacent sites with less clay and deeper-Mollic soils that can support Thurber fescue. Aspen/meadow-rue occurs on adjacent coarser soils and steeper slopes. Osha sites are rarely adjacent to forests or riparian areas.

Horizontal obstruction varies from low to moderate. Deer and elk use these sites sparingly for forage in the summer. There is little browse here, and not much cover. Deer and elk use of Community types A and B is very low in any winter. Deer and elk use of Community Type A is moderate spring through fall for forage and overnight stays; their use of Community Type B is moderately low spring through fall for forage and overnight stays.

Summary of Ecological Type Characteristics

1. Explanation of symbols in Appendix A. Percentages in [brackets] indicate the percentage of plots sampled that have that characteristic.

NUMBER OF SAMPLES	6, soil descriptions from 3 of these (total 6)
ELEVATION	9,752 ft (9,100-10,100 ft); 2,972 m (2,774-3,078 m)
AVERAGE ASPECT	89°M (r = 0.70)
LITHOLOGY	Mostly sedimentary shale and claystone [86%], some granite
FORMATIONS ¹	Km [43%], Tmi [29%], others
LANDFORMS	Slump-earthflows [80%] and soil creep slopes [20%]
SLOPE POSITIONS	All backslopes
SLOPE SHAPES	Linear [75%] to undulating [25%] horizontally, Concave [75%] to linear [25%] vertically
SLOPE ANGLE	23.7% (5-40%)
SOIL PARENT MATERIAL	Colluvium [75%] or residuum [25%]
COARSE FRAGMENTS	4.2% (0-10%) cover on surface, 16.0% (4-25%) by volume in soil
SOIL DEPTH	89 cm (65-111 cm); 35.2 in (26-44 in)
MOLLIC THICKNESS	49 cm (3-78 cm); 19.2 in (1-31 in)
TEXTURE	Silty surface (silty clay loam-silty clay [75%], subsurface is clay [75%] or silty clay [25%])
SOIL CLASSIFICATION	All Cryoboralfs, very deep [67%] to deep [33%]
TOTAL LIVE COVER	203.5% (124.5-282.4%)
NUMBER OF SPECIES	24.3 (20-32)
TOTAL LIVE COVER/NO. SPECIES	8.5% (5.7-11.3%)
CLIMATE	Outside rainshadows. Cool to moderately cold, moist to moderately moist lower Subalpine forland.
WATER	The sites get significant snowfall. Heavy layers of live vegetation and litter layers retain much moisture. These sites may sometimes be adjacent to riparian areas.

Key to Community Types

1. Osha (LIPO) conspicuous, >30% cover. Aspen peavine >15% cover **A**
 1. Osha absent or <10% cover. Aspen peavine absent to <10% cover **B**

Description of Community Types

- A** *Osha-helianthella-peavine-meadow-rue-slender wheatgrass* has osha dominant or sharing dominance with other forbs, osha is 35-70% cover. Total forb cover is 150-220%.
B *Mule's ears-false-hellebore-forbs* is dominated by a variety of dry forbs such as mule's ears (WYMA), desert sandwort (ERCO24), nodding helianthella (HEQU2), or false-hellebore (VETE4), Total forb cover is 401-170%.

Table 21-6. Community types within *Osha-Very deep heavy-clay soils*.

Community Type	No. samples	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Layer Height, m		Avg Layr Cvr %	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. ¹ , lb/ac/yr Shrubs Gramin. Forbs	Obstruct'n %: 1.5-2.0 m 1.0-1.5 m 0.5-1.0 m 0.0-0.5 m Total<2m
					Lr	Sr					
A. Osha-helianthella-peavine-meadow-rue-slender wheatgrass	2	9,920 (9,900-9,940) 26.0 (22-30)	22 (19-25) 79 (65-92) 34 (3-65)	6 (3-10) 25 (23-27) LS	GF 0.83 (0.0-1.7) S 0.70 (0.0-0.8)		98.6 T	0 (0-0) 0 (0-0) 75 (69-80) 181 (160-203)	26 (21-30) 256 (229-282) 10.2 (9.4-10.9)	0-0 1829-2172 5198-5885	0 (0-0) 5 (0-10) 55 (25-85) 98 (95-100) 39 (30-49)
B. Mule's ears-false-hellebore-forbs	4	9,668 (9,100-10,100) 22.5 (5-40)	4 111 78	4 (1-7) 13 (2-20) MS-LM	GF 0.40 (0.0-1.2) S 0.33 (0.0-0.4)		97.7 3.7	0 (0-0) 4 (0-16) 47 (3-114) 126 (69-166)	24 (20-32) 177 (125-238) 7.7 (5.7-11.3)	0-82 30-2845 377-5409	0 (0-0) 0 (0-0) 8 (5-10) 80 (75-85) 22 (20-24)

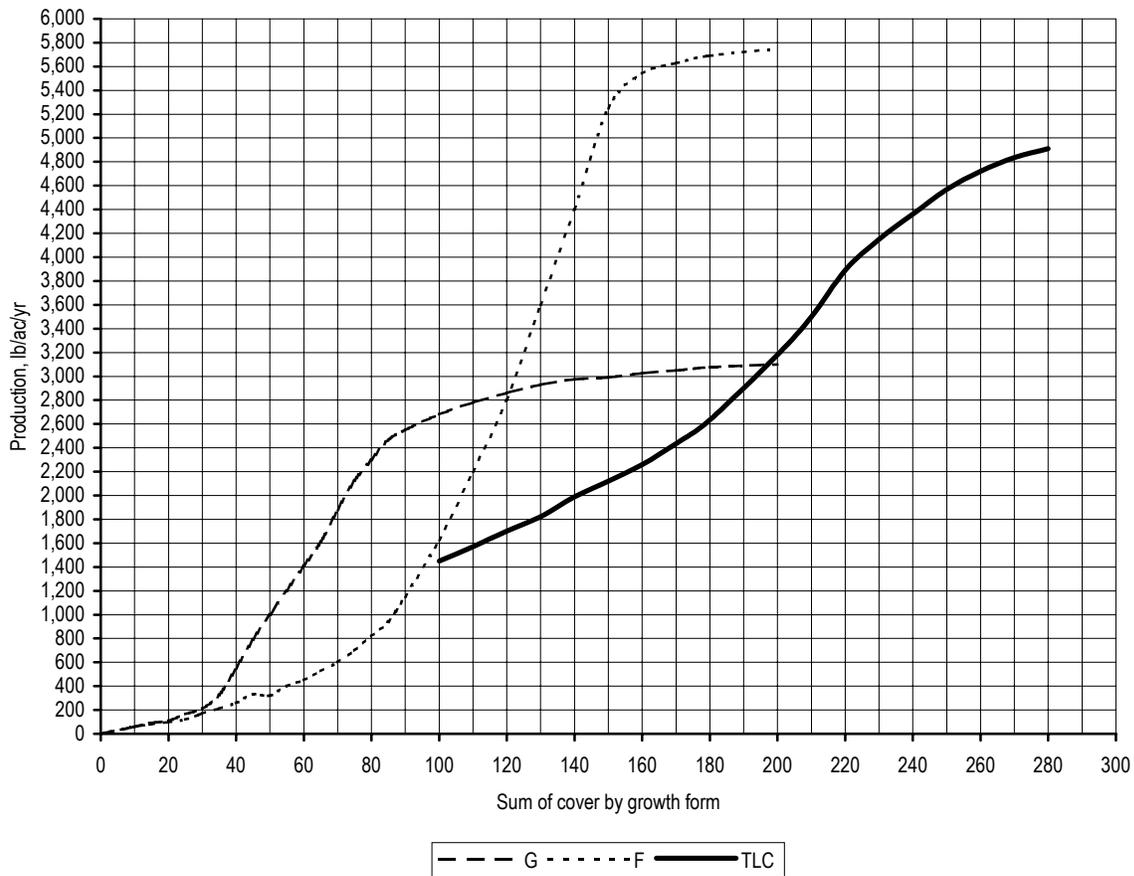


Figure 21-5. Relationship of cover by growth form and production. This is the LIPOTHFE (LIPO-THFE) model. G = graminoids, F = forbs, and TLC = Total live cover (there are typically no shrubs)

Table 21-7. Resource Values for *Osha-Very deep heavy-clay soils*. Resource values were calculated from the numbers in Table 21-6, relative to the whole UGB.

The numbers in this table can be translated: 0 = Very Low, 1 = Low, 2 = Moderately Low, 3 = Moderate, 4 = Moderately High, 5 = High, and 6 = Very High.

Resource Value	Community Type		Resource Value	Community Type	
	A	B		A	B
Potential Cattle Forage Production	4-5	0-4	Deer & Elk Forage & Browse	2-3	2-3
Grazing Suitability	0-1	0-1	Need for Watershed Protection	3	3-4
Wetland	No	No	Soil Stability	2	2
Riparian Area	No	No	Risk of Soil Loss-Natural	2	2
Developed Recreation	0-1	0-1	Risk of Soil Loss-Management	3-4	3-4
Dispersed Recreation	0-1	0-1	Risk of Permanent Depletion-Range	2	2
Scenic	3-4	3-4	Risk of Permanent Depletion-Wildlife	2	2
Road & Trail Stability	1	1	Resource Cost of Management	3-4	3-4
Construction Suitability	0-1	0-1	Cost of Rehabilitation	2	2
Deer & Elk Hiding Cover	2-3	1-2			

Table 21-8. Wildlife values (relative to the whole UGB) for the principal wildlife species using *Osha-Very deep heavy-clay soils*.

CT	Mule Deer	Elk
	Season-Preference	Season-Preference
A	Winter, Any- Very Low Spring/Fall- Moderate (Forage, Overnight)	Winter, Any- Very Low Spring/Fall- Moderate (Forage, Overnight)
B	Winter, Any- Very Low Spring/Fall- Mod. Low (Forage, Overnight)	Winter, Any- Very Low Spring/Fall- Mod. Low (Forage, Overnight)



An osha subalpine forland stand in good condition (Community Type A), dominated by osha and other tall forbs; there are few palatable grasses. Osha 66% cover, nodding brome 61%, aspen peavine 19%, slender wheatgrass 19%. Coarse Fragments Cover = 10%, Total Live Cover = 283%, Coarse Fragments in Soil = 24. Soil sampled as a Mollic Cryoboralf, Fine, Smectitic. Gothic Quadrangle, elevation 9,900 ft, 30° 042° (NE) slope. August 31, 1994.



Illustrating the deep soil beneath some osha stands. This is a gully that was cut into the soil beneath an osha stand, showing over 10 m (33 ft) depth of orange heavy clay. At much as 3 m (10 ft) beneath the surface, the soil smells strongly like osha roots. Joe Pecor and Rick Groshong investigating. Big Soap Park, September 21, 1992.

Table 21-9. Common Species in *Osha-Very deep heavy-clay soils*, where Characteristic cover > 10% or Constancy > 20%. "-" means that the species is not found. Dead cover is not listed. Ccv = Characteristic Cover, Con = Constancy. If Avc = Average Cover, then these are related using the formula $Avc = Ccv \cdot 100\% / Con$.

Code	Community Type Species	A		B		Common Name
		Ccv (Con) N = 2		Ccv (Con) 4		
SHRUBS						
SYRO	<i>Symphoricarpos rotundifolius</i>	T (50)		7 (25)		mountain snowberry
GRAMINOIDS						
BRSP2	<i>Bromelica spectabilis</i>	49 (50)		-	-	showy oniongrass
BRCA10	<i>Bromopsis canadensis</i>	3 (50)		19 (50)		fringed brome
BRPU9	<i>Bromopsis pumpelliana</i>	61 (50)		-	-	Pumpelly brome
CAHO5	<i>Carex hoodii</i>	1 (50)		2 (25)		Hood sedge
ELTR7	<i>Elymus trachycaulus</i>	18 (100)		42 (50)		slender wheatgrass
POPR	<i>Poa pratensis</i>	-	-	21 (25)		Kentucky bluegrass
PORE	<i>Poa reflexa</i>	-	-	15 (25)		nodding bluegrass
FORBS						
ACLA5	<i>Achillea lanulosa</i>	-	-	4 (50)		western yarrow
DEBA2	<i>Delphinium barbeyi</i>	3 (50)		16 (50)		Barbey larkspur
DUHO	<i>Dugaldia hoopesii</i>	-	-	7 (50)		orange sneezeweed
ERCO24	<i>Eremogone congesta</i>	-	-	46 (25)		desert sandwort
ERSP4	<i>Erigeron speciosus</i>	15 (100)		7 (50)		Oregon fleabane
ERTR19	<i>Erythrocoma triflora</i>	-	-	4 (50)		prairie smoke
FRVI	<i>Fragaria virginiana</i>	4 (50)		6 (25)		Virginia strawberry
HEQU2	<i>Helianthella quinquenervis</i>	25 (100)		6 (75)		nodding helianthella
HEMU3	<i>Heliomeris multiflora</i>	9 (100)		T (25)		showy goldeneye
HESP6	<i>Heracleum sphondylium</i>	-	-	20 (25)		cow-parsnip
HYCA4	<i>Hydrophyllum capitatum</i>	-	-	2 (50)		ballhead waterleaf
LALE2	<i>Lathyrus leucanthus</i>	19 (100)		4 (75)		aspen peavine
LIPO	<i>Ligusticum porteri</i>	52 (100)		-	-	osha
LUAR3	<i>Lupinus argenteus</i>	-	-	10 (50)		silvery lupine
PHMU3	<i>Phlox multiflora</i>	-	-	24 (25)		flowery phlox
PODO4	<i>Polygonum douglasii</i>	6 (50)		T (50)		Douglas knotweed
POPU9	<i>Potentilla pulcherrima</i>	1 (50)		5 (50)		beauty cinquefoil
SESE2	<i>Senecio serra</i>	13 (50)		3 (25)		butterweed groundsel
TAOF	<i>Taraxacum officinale</i>	20 (50)		1 (25)		common dandelion
THFE	<i>Thalictrum fendleri</i>	10 (100)		5 (75)		Fendler meadow-rue
VETE4	<i>Veratrum tenuipetalum</i>	3 (100)		60 (25)		Colorado false-hellebore
VIAM	<i>Vicia americana</i>	3 (50)		2 (75)		American vetch
WYMA	<i>Wyethia x magna</i>	-	-	68 (50)		mule's ears
FORB	forb unknown	19 (50)		-	-	unknown forb
GROUND COVER						
.BARESO	bare soil	25 (100)		13 (100)		
.LITTER	litter and duff	69 (100)		84 (100)		
.GRAVEL	gravel 0.2-10 cm	3		1		
.COBBLE	cobble 10-25 cm	-	-	2 (25)		
.STONES	stone > 25 cm	-	-	T (25)		
.MOSSON	moss on soil	-	-	-	-	
LICHENS	lichens on soil	-	-	-	-	