

TECHNICAL NOTE

U.S. Department of Agriculture

Nevada

Natural Resources Conservation Service

TN – Range – NV-55 February 2010

Plant Characteristics (MLRA 30)



Nevada NRCS
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Grasses (Symbol)	Page Number
ACAR14	1
ACHY	1
ACLE9	1
ACPAD	2
ACSP12	2
ARPU9	2
BOER4	3
BOGR2	3
BRCI2	4
CANE2	4
CAREX	4
CARO5	5
DECE	5
DISP	5
ELEL5	6
ELTR7	6
ERPU8	7
FEBR	7
HECO26	7
JUBA	7
JUNCU	8
LECI4	8
LETR5	9
MUPO2	9
MURI	9
PHAU7	10
PLJA	10
PLRI3	10
POA	11
POFE	11
POSE	11
PSSPS	12
SCRIP	12
SPAI	12
SPCO4	13
SPCR	13
SPFL2	13
TRMU	14
TYPHA	14

Grasses (Scientific)	Page Number
<i>Achnatherum aridum</i>	1
<i>Achnatherum hymenoides</i>	1
<i>Achnatherum lettermanii</i>	1
<i>Achnatherum parishii</i> var. <i>depauperatum</i>	2
<i>Achnatherum speciosum</i>	2
<i>Aristida purpurea</i>	2
<i>Bouteloua eriopoda</i>	3
<i>Bouteloua gracilis</i>	3
<i>Bromus ciliatus</i>	4
<i>Carex</i>	4
<i>Carex nebrascensis</i>	4
<i>Carex rossii</i>	5
<i>Deschampsia cespitosa</i>	5
<i>Distichlis spicata</i>	5
<i>Elymus elymoides</i>	6
<i>Elymus trachycaulus</i>	6
<i>Erioneuron pulchellum</i>	7
<i>Festuca brachyphylla</i>	7
<i>Hesperostipa comata</i>	7
<i>Juncus</i>	8
<i>Juncus balticus</i>	7
<i>Leymus cinereus</i>	8
<i>Leymus triticoides</i>	9
<i>Muhlenbergia porteri</i>	9
<i>Muhlenbergia richardsonis</i>	9
<i>Phragmites australis</i>	10
<i>Pleuraphis jamesii</i>	10
<i>Pleuraphis rigida</i>	10
<i>Poa</i>	11
<i>Poa fendleriana</i>	11
<i>Poa secunda</i>	11
<i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>	12
<i>Scirpus</i>	12
<i>Sporobolus airoides</i>	12
<i>Sporobolus contractus</i>	13
<i>Sporobolus cryptandrus</i>	13
<i>Sporobolus flexuosus</i>	13
<i>Tridens muticus</i>	14
<i>Typha latifolia</i>	14

Grasses (Common)	Page Number
alkali sacaton	12
alpine fescue	7
baltic rush	7
basin wildrye	8
big galleta	10
black grama	3
blue grama	3
bluebunch wheatgrass	12
bluegrass	11
bottlebrush squirreltail	6
bulrush	12
bush muhly	9
common cattail	14
common reed	10
creeping wildrye	9
desert needlegrass	2
fluffgrass	7
fringed brome	4
galleta	10
Indian ricegrass	1
inland saltgrass	5
Letterman's needlegrass	1
little Parish's needlegrass	2
mat muhly	9
mesa dropseed	13
Mormon needlegrass	1
muttongrass	11
Nebraska sedge	4
needleandthread	7
purple threeawn	2
Ross' sedge	5
rush	8
sand dropseed	13
Sandberg bluegrass	11
sedge	4
slender wheatgrass	6
slim tridens	14
spike dropseed	13
tufted hairgrass	5

Shrubs (Symbol)	Page Number
ACGR	15
ACSH	15
AGUT	15
ALWR	15
AMDU2	16
AMER	16
AMUT	16
ARNO4	17
ARPU5	17
ARTRT	17
ARTRV	18
ATCA2	18
ATCO	19
ATHY	19
ATLE	19
ATPA3	20
ATPO	20
ATSP	20
ATTO	20
BAEM	21
BASA2	21
BEJU	21
CEIN7	21
CELEI4	21
CHLI2	22
CHPA12	22
CORA	22
CRCA5	23
ENCEL	23
ENFA	23
ENFR	24
ENVI	24
EPCA2	24
EPNE	25
EPTO	25
EPVI	25
ERCO40	26
ERFAP	26
ERNA10	26
FAPA	27
FOSP2	27
GRSP	27
HODI	28
HYMO	28
HYSA	28
ISAC2	28
JUCOD	29
KRER / (KRPA)	29
KRGR	29

KRLA2	30
LATR2	30
LEFR2	31
LYAN	31
LYCO2	31

Shrubs (Symbol cont'd)	Page Number
LYPA	32
MESP2	32
MOUT	32
OPAC	32
OPBA2	33
PEPA13	33
PESC4	33
PIDE4 / (ARSP5)	33
PLSE	34
PRAN2	34
PRFA	34
PRGL2	35
PRPU	35
PSCO2	36
PSFR	36
PSPO	36
PSSP3	36
PUST	37
QUGA	37
QUTU2	37
RICE	38
RIMO2	38
ROWO	38
SADOC4	39
SAEX	39
SAME	40
SAMO3	40
SAVE4	40
SAVEB	41
SEAR8	41
SUMO	41
SYLO	41
SYOR2	42
TICA3	42
TIPA	42
VIPA14	42
XYTO2	42
YUBA	43
YUBR	43
YUSC2	43

<u>Shrubs (Scientific)</u>	<u>Page Number</u>
<i>Acacia greggii</i>	15
<i>Acamptopappus shockleyi</i>	15
<i>Agave utahensis</i>	15
<i>Aloysia wrightii</i>	15
<i>Ambrosia dumosa</i>	16
<i>Ambrosia eriocentra</i>	16
<i>Amelanchier utahensis</i>	16
<i>Arctostaphylos pungens</i>	17
<i>Artemisia nova</i>	17
<i>Artemisia tridentata ssp. tridentata</i>	17
<i>Artemisia tridentata ssp. vaseyana</i>	18
<i>Atriplex canescens</i>	18
<i>Atriplex confertifolia</i>	19
<i>Atriplex hymenelytra</i>	19
<i>Atriplex lentiformis</i>	19
<i>Atriplex parryi</i>	20
<i>Atriplex polycarpa</i>	20
<i>Atriplex spinifera</i>	20
<i>Atriplex torreyi</i>	20
<i>Baccharis emoryi</i>	21
<i>Baccharis sarothroides</i>	21
<i>Bebbia juncea</i>	21
<i>Cercocarpus intricatus</i>	21
<i>Cercocarpus ledifolius var. intercedens</i>	21
<i>Chilopsis linearis</i>	22
<i>Chrysothamnus paniculatus</i>	22
<i>Coleogyne ramosissima</i>	22
<i>Croton californica</i>	23
<i>Encelia</i>	23
<i>Encelia farinosa</i>	23
<i>Encelia frutescens</i>	24
<i>Encelia virginensis</i>	24
<i>Ephedra californica</i>	24
<i>Ephedra nevadensis</i>	25
<i>Ephedra torreyana</i>	25
<i>Ephedra viridis</i>	25
<i>Ericameria compacta</i>	26
<i>Ericameria nauseosa</i>	26
<i>Eriogonum fasciculatum var. polifolium</i>	26
<i>Fallugia paradoxa</i>	27
<i>Fouquieria splendens</i>	27
<i>Grayia spinosa</i>	27
<i>Holodiscus discolor</i>	28
<i>Hymenoclea monogyra</i>	28
<i>Hymenoclea salsola</i>	28
<i>Isocoma acradenia</i>	28
<i>Juniperus communis var. depressa</i>	29

<i>Krameria erecta / (parvifolia)</i>	29
<i>Krameria grayi</i>	29
<i>Krashennikovia lanata</i>	30
<i>Larrea tridentata</i>	30
<i>Lepidium fremontii</i>	31
<i>Lycium andersonii</i>	31
<i>Lycium cooperi</i>	31
<u>Shrubs (Scientific cont'd)</u>	<u>Page Number</u>
<i>Lycium pallidum</i>	32
<i>Menodora spinescens</i>	32
<i>Mortonia utahensis</i>	32
<i>Opuntia acanthocarpa</i>	32
<i>Opuntia basilaris</i>	33
<i>Petalonyx parryi</i>	33
<i>Peucephyllum schottii</i>	33
<i>Picrothamnus desertorum</i>	33
<i>Pluchea sericea</i>	34
<i>Prosopis glandulosa</i>	35
<i>Prosopis pubescens</i>	35
<i>Prunus andersonii</i>	34
<i>Prunus fasciculata</i>	34
<i>Psilostrophe cooperi</i>	36
<i>Psorothamnus fremontii</i>	36
<i>Psorothamnus polydenius</i>	36
<i>Psorothamnus spinosus</i>	36
<i>Purshia stansburiana</i>	37
<i>Quercus gambelii</i>	37
<i>Quercus turbinella</i>	37
<i>Ribes cereum</i>	38
<i>Ribes montigenum</i>	38
<i>Rosa woodsii</i>	38
<i>Salazaria mexicana</i>	40
<i>Salix exigua</i>	39
<i>Salvia dorrii</i>	39
<i>Salvia mohavensis</i>	40
<i>Sarcobatus vermiculatus</i>	40
<i>Sarcobatus vermiculatus var. baileyi</i>	41
<i>Senna armata</i>	41
<i>Suaeda moquinii</i>	41
<i>Symphoricarpos longiflorus</i>	41
<i>Symphoricarpos oreophilus</i>	42
<i>Tiquilia canescens</i>	42
<i>Tiquilia palmeri</i>	42
<i>Viguiera parishii</i>	42
<i>Xylorhiza tortifolia</i>	42
<i>Yucca baccata</i>	43
<i>Yucca brevifolia</i>	43
<i>Yucca schidigera</i>	43

Shrubs (Common) Page Number

alkali goldenbush	28
alkali seepweed	41
Anderson's wolfberry	31
Apache plume	27
arrowweed	34
Bailey's greasewood	41
banana yucca	43
basin big sagebrush	17
beavertail pricklypear	33
big saltbush	19
black greasewood	40
black sagebrush	17
blackbrush	22
bladdersage	40
brittlebush	23
buckhorn cholla	32
bud sagebrush	33
bush encelia	24
California croton	23
California ephedra	24
catclaw acacia	15
cattle saltbush	20
Charleston Mountain goldenbush	26
cheeseweed burrobrush	28
common juniper	29
Cooper's wolfberry	31
coyote willow	39
creosote bush	30
curl-leaf mountain mahogany	21
desert almond	34
desert peach	34
desert pepperweed	31
desert rabbitbrush	22
desert snowberry	41
desert willow	22
desertbroom	21
desertholly	19
desertsenna	41
Emory's baccharis	21
fourwing saltbrush	18
Fremont's dalea	36
Gambel's oak	37
gooseberry currant	38
hollyleaf bursage	16
honey mesquite	35

Joshua tree	43
lemon verbena	15
littleleaf mountain mahogany	21
Mojave aster	42
Mojave buckwheat	26
Mojave sage	40
Mormon tea	25
mountain big sagebrush	18
mountain snowberry	42

Shrubs (Common cont'd) Page Number

Nevada dalea	36
Nevada ephedra	25
oceanspray	28
ocotillo	27
pale wolfberry	32
Palmer's tiquilia	42
Parry's saltbush	20
Parry's sandpaper plant	33
pointleaf manzanita	17
purple sage	39
pygmycedar	33
range ratany	29
rubber rabbitbrush	26
screwbean mesquite	35
shadscale	19
Shockley's goldenhead	15
shrubby tiquilia	42
smoketree	36
Spanish dagger / Mojave yucca	43
spinescale saltbush	20
spiny hopsage	27
spiny menodora	32
Stansbury's cliffrose	37
sweetbush	21
Torrey's ephedra	25
Torrey's quailbush	20
triangle goldeneye	42
turbinella oak	37
Utah agave	15
Utah mortonia	32
Utah serviceberry	16
Virgin River encelia	25
wax currant	38
white brittlebush	23
white burrobrush	28
white bursage	16
white ratany	29
whitestem paperflower	36
winterfat	30
Wood's rose	38

Trees (Symbol)	Page Number
ABCOC	45
ACGLD3	45
JUOS	46
JUSC2	46
PIFL2	47
PILO	47
PIMO	48
PIPOS	48
POFR2	49
POTR5	49

Trees (Scientific)	Page Number
<i>Abies concolor</i>	45
<i>Acer glabrum var. difusum</i>	45
<i>Juniperus osteosperma</i>	46
<i>Juniperus scopulorum</i>	46
<i>Pinus flexilis</i>	47
<i>Pinus longaeva</i>	47
<i>Pinus monophylla</i>	48
<i>Pinus ponderosa var. scopulorum</i>	48
<i>Populus fremontii</i>	49
<i>Populus tremuloides</i>	49

Trees (Common)	Page Number
Fremont's cottonwood_____	49
Great Basin bristlecone pine_____	47
limber pine_____	47
quaking aspen_____	49
Rocky Mountain juniper_____	46
Rocky Mountain maple_____	45
Rocky Mountain ponderosa pine_____	48
Rocky Mountain white fir_____	45
singleleaf pinyon_____	48
Utah juniper_____	46

References	Page Number
References_____	51

GRASSES

ACAR14 *Achnatherum aridum* Mormon needlegrass

Fire Effects

Needlegrasses are damaged by burning due to the dense plant material that can burn slowly and long, charring to the growing points. Late summer and early fall fires are the least harmful.

Grazing Effects

Mormon needlegrass is grazed by horses, cattle and sheep year round. Mule deer and pronghorn graze on Mormon needlegrass during the spring and early summer.

Site Characteristics

Mormon needlegrass occurs on rocky outcrops in shadscale and sagebrush deserts and foothills up to the pinyon-juniper woodlands and on steep talus slopes on limestone mountains and calcareous outcrops at elevations between 4,400 and 6,500 feet and precipitation ranging from 8 to 12 inches. Mormon needlegrass is known only from southern Nevada, extending north as far as Saulsburry Wash, San Antonio Mountains to the West Spotted Range and Buried Hills, Nye County; to the Spotted Range, and McCullough mountains, Clark County; to the Groom Range, Lincoln County.

Soils

Mormon needlegrass grows on soils that are very shallow to shallow and well-drained. The soil profile is modified with high amounts of rock fragments.

ACHY *Achnatherum hymenoides* Indian ricegrass

Fire Effects

Indian ricegrass can be killed by fire, depending on severity and season of burn. Indian ricegrass reestablishes on burned sites through seed dispersed from adjacent unburned areas.

Grazing Effects

Indian ricegrass benefits from grazing use if it is moderately grazed in winter and early spring. Heavy early spring grazing may sharply reduce the vigor of Indian ricegrass and decrease the stand. Indian ricegrass is highly palatable to all classes of livestock in both green and cured condition. It supplies a source of green feed before most other native grasses have produced much new

growth. Indian ricegrass is eaten by pronghorn in moderate amounts whenever available. A number of heteromyid rodents inhabiting desert rangelands show preference for seed of Indian ricegrass. Indian ricegrass is an important component of jackrabbit diets in spring and summer. Indian ricegrass seed provides food for many species of birds. Doves, for example, eat large amounts of shattered Indian ricegrass seed lying on the ground.

Site Characteristics

Indian ricegrass is found in plains, foothills, mountains, and intermountain basins at elevations between 1,500 and 9,500 feet. It does well on hot, dry southern exposures. It grows best in areas with average annual precipitation of 8 inches to above 14 inches. It has been seeded in areas with as low as 6 inches of rainfall and reproduced. Indian ricegrass is common and known in all counties within the state.

Soils

Indian ricegrass prefers sandy coarse textured soils and can be found on sands, fine sandy loams, silt loams, clay loams, gravelly, rocky, to shale areas.

ACLE9 *Achnatherum lettermanii*

Letterman's needlegrass

Fire Effects

Little specific information is available on adaptations of Letterman's needlegrass to fire. It is morphologically similar to Columbia needlegrass, which is only slightly too moderately damaged by fire. The season of burn affects the plant's ability to survive a fire. Post fire regeneration is through seeding and tillering.

Grazing Effects

Letterman's needlegrass begins growth early in the year and remains green throughout the relatively long growing season, thus, making it valuable forage for livestock. Letterman's needlegrass tends to increase in response to heavy grazing by domestic sheep. It apparently decreases in response to light cattle and horse grazing. In the absence of grazing, Letterman's needlegrass competes poorly with such species as Kentucky bluegrass and Thurber fescue. Letterman's needlegrass provides valuable forage for many species of wildlife. It is consumed by mule deer and is most palatable early in the

season before the foliage becomes coarse and wiry.

Site Characteristics

Letterman's needlegrass can be found in a wide range of habitat types from open stands of quaking aspen and conifers to subalpine grasslands to sagebrush/grass ranges.

Letterman's needlegrass occurs across a wide range of elevations and exposures. It is commonly found on gentle slopes (3-10%) with a northern aspect. The annual precipitation is 0.74 to 29 inches.

Letterman's needlegrass is commonly scattered throughout the state at elevations between 6,600 and 10,000 feet.

Soils

Letterman's needlegrass is found on sandy loam, loam, silty clay loam, or clay loam soils. It typically occurs on dry soils 15 inches or more in depth, but it can be found on very fertile soils or severely eroded ones.

ACPAD *Achnatherum parishii* var. *depauperatum* little Parish's needlegrass

Fire Effects

Little Parish's needlegrasses are damaged by burning due to the dense plant material that can burn slowly and long, charring to the growing points. Late summer and early fall fires are the least harmful.

Grazing Effects

Little Parish's needlegrass provides a palatable, nutritious feed during the spring and early summer for livestock and wildlife.

Site Characteristics

Little Parish's needlegrass occurs on dry, rocky or sandy slopes and ridges, mostly in pinyon-juniper at elevations between 3,000 and 6,000 feet and precipitation ranging from 12 to 14 inches. Little Parish's needlegrass is mostly in southern Nevada; extending north as far as Wheeler Peak area, Snake Range, White Pine County; and west to Candelaria, Mineral County; extending south through Nye and Lincoln Counties; to the Spring and McCullough Mountains, Clark County.

Soils

Little Parish's needlegrass grows in shallow to moderately deep soils derived from granite, schist or gneiss. Soil textures vary from cobbly, stony, or gravelly sandy loams to loams with high amounts of rock fragments.

ACSP12 *Achnatherum speciosum* desert needlegrass

Fire Effects

Desert needlegrass has persistent dead leaf bases, which make it susceptible to burning. Fire removes the accumulation; a rapid, cool fire will not burn deep into the root crown and surviving tufts will resprout.

Grazing Effects

Young desert needlegrass is palatable to all classes of livestock. Mature herbage is moderately grazed by horses and cattle, but rarely grazed by sheep. Desert needlegrass may be eliminated from areas with a high concentration of grazing animals due to excessive trampling and overgrazing. On disturbed sites, desert needlegrass quickly reestablishes. Young desert needlegrass is palatable to many species of wildlife. Desert needlegrass produces considerable basal foliage and is good forage while young. Desert bighorn sheep graze desert needlegrass.

Site Characteristics

Desert needlegrass grows on alluvial, dry rocky hills, talus slopes, and in canyons. Desert needlegrass is found at elevations from 2,000 to 6,000 feet and precipitation ranging from 6 to 14 inches. Desert needlegrass grows in warm to temperate Mediterranean climates, characterized by mild winters and warm to hot summers. Common and widespread throughout the state except for the northeast corner.

Soils

Desert needlegrass typically occurs on coarse to medium textured soils, often on sandy or gravelly alluvial fans with a pH between 6.0 and 8.0.

ARPU9 *Aristida purpurea* purple threeawn

Fire Effects

Threeawns are readily harmed by fire because their rootcrowns are close to or above the soil surface. Purple threeawn is generally reduced by fire for several growing seasons. Purple threeawn recovers from fire by tillering. It probably also establishes from seed after fire. It is a seedbanking species with seeds stored below ground, where they are insulated from heat damage by fire.

Grazing Effects

In most regions, forage value of purple threeawn is only poor to fair. The long awns irritate and cause abscesses in the mouths and nostrils of grazing animals. Livestock generally avoid purple threeawn for most of the year when other forage is available. In areas where purple threeawn is abundant, livestock may make moderate use of it in spring before awns develop and in fall and winter after seed shatter. Wildlife species tend to avoid purple threeawn for most of the year when other forage is available.

Site Characteristics

Purple threeawn is most common on coarse-grained, xeric soils. In the Intermountain region, it often dominates grassland communities on gravelly or sandy soils. Purple threeawn is also common on disturbed sites such as roadsides and railway rights-of-way.

Soils

Purple threeawn generally grows on rocky or sandy soils, it may occur on soils of other textures.

BOER4 *Bouteloua eriopoda* black grama

Fire Effects

Black grama is reported to be fire sensitive. Black grama is generally top-killed by fire. It usually recovers from fire slowly, through vegetative spread. However, black grama grows quickly in response to summer moisture, and its post fire recovery can be good if the stand was healthy before fire and there is adequate precipitation in the first two growing seasons after fire.

Grazing Effects

Overall, black grama is one of the most nutritious desert winter grasses for livestock. Black grama is considered excellent forage for all livestock classes. Black grama shows variable tolerance to grazing, with several abiotic and biotic factors contributing to overall grazing response. In general, black grama decreases under grazing. Vigor is extremely impaired by heavy grazing; however, black grama is tolerant of light grazing. Population increases for black grama are greatest under grazing exclusion, due to reliance upon stoloniferous regeneration. Stolons growing horizontally outward from tufts are very susceptible to grazing and trampling damage, and intense

grazing pressure may shift regeneration of black grama from stoloniferous expansion to tillering. The season of grazing influences black grama tolerance. In general, black grama is readily damaged under summer grazing. Fall, winter, and spring grazing produce less damage. Black grama is considered excellent forage for many species of wildlife.

Site Characteristics

Black grama can be found where mean annual precipitation is about 12 to 18 inches and elevations between 3,500 and 6,000 feet. It occurs on rocky or sandy mesas and dry, open ground. The majority of precipitation (> 50%) within sites dominated by black grama occurs from July to September. Black grama is restricted but locally common from the McCullough Mountains, Clark County, where it represents one of the most abundant perennial grass species.

Soils

Black grama grows on well-drained sandy and gravelly soils with a pH between 7.0 and 8.3. Black grama is rarely found on clay loams or adobe flats.

BOGR2 *Bouteloua gracilis* blue grama

Fire Effects

Blue grama has variable fire tolerance; it has fair tolerance when dormant but experiences some damage if burned during active growth, especially during drought. Fire generally favors blue grama, generally increasing its occurrence, production, and percent cover.

Grazing Effects

Blue grama is valuable forage for all classes of domestic livestock, providing excellent forage for cattle and sheep. Blue grama tends to be most productive following summer rains, but it cures well and provides forage year round. Blue grama is generally tolerant of grazing, increasing under grazing pressure and resisting trampling. Blue grama withstands clipping or grazing more effectively when grazed after it has matured or when it is only slightly grazed during its growing period. Blue grama may decrease if subject to continued heavy grazing, especially when accompanied by dry conditions. Heavy grazing also encourages a sod-forming rather than bunchgrass growth

habit in blue grama. Heavy grazing can potentially reduce tillering and tiller weight, and decrease concentrations of total nonstructural carbohydrates in blue grama forage. Blue grama also provides important forage for mule deer. Quail and some songbirds eat the seeds of blue grama. Small mammals also eat blue grama seeds and stems. Flower heads and seeds of blue grama are also consumed by grasshoppers, which can all but eliminate an annual seed crop.

Site Characteristics

The elevational range of blue grama is 5,600 to 8,500 feet. Blue grama generally requires 8 to 15 inches of annual precipitation. In the Great Basin, precipitation is irregular, usually around 7 inches, and occurs primarily in spring and summer months throughout its range. Blue grama grows both in low-lying areas and on uplands. It is found on dry prairies, sand hills, valley floors, alluvial benches and fans, drainages, mesas, toe slopes, and steeper slopes up to 35%. Blue grama is known in central, southern and southeastern Nevada, from the White Mountains, Esmeralda County; to the Snake and Schell Creek Range, White Pine County; Monitor Range, Eureka County; Lincoln County; Pahute Mesa, to east Kawich Valley and southern Penoyer Valley, Nye County; south to the Spring and McCullough Mountains, Clark County.

Soils

Blue grama occupies a range of well-drained soil types, from fine to coarse textured. It grows on clay, silt, fine loams, loams, sandy loams, sand, and gravelly soils. Blue grama is also tolerant of alkaline soils and is rarely found on even weakly acid soils. Blue grama has been reported as fair to moderately tolerant and intolerant of salt, tending to have a shallow root system that avoids soil salinity.

BRCI2 *Bromus ciliatus* fringed brome

Fire Effects

Fringed brome is probably top-killed by most fires. Fringed brome has low tolerance to fires of moderate and high intensity. The seeds of most plants can survive grass fires, so it is likely that seeds of fringed brome in grasslands survive fire.

Grazing Effects

Fringed brome is a good source of forage on western forest ranges. Fringed brome is browsed by livestock and is considered one of the best range grasses. Fringed brome is an important forage species for livestock, and deer throughout the summer months.

Site Characteristics

Fringed brome occurs in a variety of habitats including woodlands, forest openings, thickets, grasslands, shrublands, prairies, meadows, marshes, bogs, fens, and stream and lake margins. It is commonly found in moist places such as wet meadows, benches, and along streams. Fringed brome also occurs on moist to seasonally dry, open or densely shaded habitats in valleys and montane zones.

Soils

Fringed brome grows best on moist to semiwet soils, but is tolerant of poorly drained and subirrigated conditions. It grows best on loam, silty loam, and sand, but occurs on stony or bouldery substrates as well.

CANE2 *Carex nebrascensis* Nebraska sedge

Fire Effects

Nebraska sedge has a high fire tolerance. Nebraska sedge is common under infrequent fire regimes, due to the high moisture in the surrounding area.

Grazing Effects

Palatability of Nebraska sedge is high for grazing animals and medium for browse animals. Nebraska sedge is an important forage species for many wildlife species.

Site Characteristics

Nebraska sedge occurs in swamps, meadows, springs, and along streams and lakes, often in conifer stands at elevations between 4,800 and 8,300 feet and precipitation ranging from 6 to 45 inches. Nebraska sedge is common and widespread throughout much of the state.

Soils

Nebraska sedge grows on soils that are fine, medium and coarse textured soils with a pH ranging between 5.7 and 7.4. Nebraska sedge has medium tolerance to calcium carbonate.

CAREX *Carex* sedge

Fire Effects

Sedge is top-killed by fire, with rhizomes protected by insulating soil. The rhizomes of sedge species may be killed by high-severity fires that remove most of the soil organic layer. Reestablishment after fire occurs by seed establishment and/or rhizomatous spread.

Grazing Effects

Sedge provides good to fair forage for domestic grazing. Sedges have a high to medium value for mule deer.

Site Characteristics

This site occurs on mountain convex slopes, drainages, inset fans, mountain valleys, and around localized seeps and springs. Elevations range from 6000 to 9500 feet.

Soils

The soils associated with sedge sites tend to be very deep and well drained. These soils typically have moderately permeability, high available water capacity, and low runoff.

CAR05 *Carex rossii* Ross' sedge

Fire Effects

Ross' sedge survives fire through buried seed with long-term viability. These seeds germinate after heat treatment. Ross' sedge's rhizomes survive low- to moderate-severity fires.

Grazing Effects

Ross' sedge provides good to fair forage for domestic grazing. Ross' sedge may be a poor to good forage plant depending on the site. Palatability of Ross' sedge has been rated fair for domestic sheep, horses, cattle, and small mammals. Ross' sedge is important summer elk forage, particularly in the first half of the growing season. It has been rated good for elk and poor for mule deer and pronghorn.

Site Characteristics

Ross' sedge is dominant or codominant in xerophytic grasslands, open timber stands, and exposed hillsides of mountain and subalpine zones. Slopes generally range from 0 to 35 percent. Precipitation is variable. Ross' sedge prefers a southern aspect, but it will grow on other aspects. Ross' sedge can be found at elevations between 6,900 and 11,000 feet. Ross' sedge is common throughout Nevada.

Soils

Ross' sedge occurs at dry, well-drained sites. Soil types are shallow, dry to

moderately dry, coarse or fine textured, ranging from sandy loam to clay loam. They may be unstable or compact, mildly saline, nitrogen moderate, with a pH range of 6.0 to 6.7. Ross' sedge occurs sporadically on stony or rocky soils.

DECE *Deschampsia cespitosa* tufted hairgrass

Fire Effects

Tufted hairgrass generally survives all but the most severe fires. It usually sprouts from the root crown after aerial portions are burned. Tufts formed by the leaves often protect basal buds from fire damage. Tufted hairgrass seeds occur in the seedbank; after fire tufted hairgrass may regenerate from soil-stored seed.

Grazing Effects

Tufted hairgrass provides good to excellent forage for all classes of livestock. It is often an abundant source of forage throughout its growing season. Tufted hairgrass is a decreaser with excessive grazing by cattle. However, it is tolerant of moderate amounts of fairly close grazing because of dense growth and tillering. Tufted hairgrass is favored by moderate grazing in areas where shrubs and other vegetation invade in the absence of grazing. Tufted hairgrass has a high to moderate resource value for elk and a medium value for mule deer. Use of tufted hairgrass by wildlife species is variable. Tufted hairgrass forage value for wildlife has been rated fair to good.

Site Characteristics

Tufted hairgrass is found in very moist to saturated habitats at the margins of bogs and marshes and in sloughs, moist areas along shores, drainage ditches, and moist draws, and in moderately dry to very dry locations on slopes. It is frequently found on disturbed sites, especially at higher elevations and moist habitats. Tufted hairgrass is found at elevations between 6,700 and 11,000 feet, where there is 16 inches of annual precipitation and supplemental run-in water. Tufted hairgrass is commonly scattered throughout the state.

Soils

Tufted hairgrass is found on sandy loams, sandy clay loams, silt loams, loams, and clays.

DISP *Distichlis spicata* inland saltgrass

Fire Effects

Fire top-kills inland saltgrass. Saltgrass establishes after fire through seed and/or lateral spread by rhizomes.

Grazing Effects

Saltgrass's value as forage depends primarily on the relative availability of other grasses of higher nutritional value and palatability. It can be an especially important late summer grass in arid environments after other forage grasses have deceased. Saltgrass is rated as a fair to good forage species only because it stays green after most other grasses dry. Livestock generally avoid saltgrass due to its coarse foliage. Saltgrass is described as an increaser under grazing pressure. Saltgrass provides cover for a variety of bird species, small mammals, and arthropods and is on occasion used as forage for several big game wildlife species.

Site Characteristics

Saltgrass is found in a wide range of environments that include salt marshes, sandy flats, inland salt marshes, alkaline flats, coastal tidal marshes, foothills, deserts, grasslands, salt playas, and along the banks of streams, rivers, and lakes. It is one of the most drought-tolerant species. Inland saltgrass is found at elevations between 1,600 and 6,400 feet and precipitation ranging from 4 to 14 inches. Inland saltgrass is common and widespread throughout the state.

Soils

Inland saltgrass is generally found on sandy, saline soils with poor drainage in areas other than inland and tidal salt marshes. Generally inland saltgrass prefers soils composed of fine-grained sand. Inland saltgrass grows vigorously on moist, saline soils where most other species cannot survive. Saltgrass tolerates a wide range of soil salinities and pH levels.

ELEL5 *Elymus elymoides* bottlebrush squirreltail

Fire Effects

Bottlebrush squirreltail's small size, coarse stems, and sparse leafy material aid in its tolerance of fire. Post fire regeneration occurs from surviving root crowns and from on- and off-site seed sources. Frequency of

disturbance greatly influences post fire response of bottlebrush squirreltail.

Undisturbed plants within a 6 to 9 year age class generally contain large amounts of dead material, increasing bottlebrush squirreltail's susceptibility to fire.

Grazing Effects

Bottlebrush squirreltail generally increases in abundance when moderately grazed or protected on the foothills of intermountain winter ranges. Bottlebrush squirreltail is very palatable winter forage for domestic sheep of Intermountain ranges. Domestic sheep relish the green foliage. Overall, bottlebrush squirreltail is considered moderately palatable to livestock.

Bottlebrush squirreltail is a dietary component of several wildlife species.

Site Characteristics

Bottlebrush squirreltail occurs in sagebrush, shadscale, greasewood and pinyon-juniper communities. Bottlebrush squirreltail can be found at elevations between 2,000 to 7,000 feet. Rainfall ranges from 8 to 20 inches average annual precipitation. Bottlebrush squirreltail is common and widespread throughout the state.

Soils

Bottlebrush squirreltail grows well in medium to fine-textured soils, but also commonly occupies on coarse-textured to gravelly soils.

ELTR7 *Elymus trachycaulus* slender wheatgrass

Fire Effects

Slender wheatgrass is a short-lived species that is favored by summer or fall fires. The dense roots survive, and plants establishes from tillers and soil-stored seed in the seed bank. Fire effects upon this species differ according to the growth habit of the variety.

Grazing Effects

Slender wheatgrass is grazed by all classes of livestock. Slender wheatgrass will maintain vigor indefinitely under moderate grazing. It is a decreaser on overgrazed cattle ranges because its short rootstocks cannot withstand heavy grazing as well as species with well-developed rhizomes. Slender wheatgrass is grazed by sage grouse, deer, elk, moose, and bighorn sheep, mountain goat, pronghorn, and various rodents. The seeds are eaten by various seed

predators. Slender wheatgrass provides hiding and thermal cover for songbirds, upland game birds, waterfowl, and small mammals.

Site Characteristics

Slender wheatgrass is found in many plant communities including Wyoming, basin and mountain big sagebrush, aspen, ponderosa pine, spruce-fir and lodgepole pine. It is found at elevations between 6,500 to 11,000 feet. Slender wheatgrass grows naturally in moist to dry sites receiving 10 to 20 inches annual precipitation. Slender wheatgrass is common and widespread throughout the state.

Soils

Slender wheatgrass grows in dry to moist, medium-textured soil. It tolerates silt and clay but does best on sandy loam. This species has a high salt tolerance. Soil pH usually ranges from moderately acid to moderately alkaline, although it has been reported growing in soils with a pH as high as 8.8.

ERPUS *Erioneuron pulchellum* fluffgrass

Fire Effects

No information available.

Grazing Effects

Fluffgrass is a poor forage grass for livestock and wildlife.

Site Characteristics

Fluffgrass is found on desert slopes, flats and lower canyons on limestone rocks with saltbush, creosotebush, rabbitbrush, bursage, blackbrush, hopsage and wolfberry at elevations between 2,000 and 6,000 feet. Fluffgrass is known only in southern Nevada at the Sierra Peak Range, Esmeralda County; Twin Rivers and Frenchman Flats, Nye County; Crystal Springs and Panaca Hotsprings, Lincoln County; south to Las Vegas and extending to the Virgin, Spring, McCullough and Newberry Mountains, Clark County.

Soils

Fluffgrass grows on sandy, rocky soils.

FEBR *Festuca brachyphylla* alpine fescue

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

Alpine fescue occurs on moderately moist ground from the sagebrush zone to the alpine tundra zone, usually in rocky open areas at elevations between 7,300 and 10,000 feet and precipitation ranging from 25 to over 35 inches. Alpine fescue is common and widespread throughout the state.

Soils

Alpine fescue grows on shallow to very shallow, poorly developed soils with high amounts of rock fragments in the profile.

HECO26 *Hesperostipa comata* needleandthread

Fire Effects

Needleandthread grass is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needleandthread grass in sagebrush ecosystems is classified as slightly damaged by fire, and in intermountain rangelands, as severely damaged. Needleandthread grass sprouts from the caudex following fire, if heat has not been sufficient to kill underground parts. Recovery usually takes 2 to 10 years.

Grazing Effects

Needleandthread provides highly palatable forage, especially in the spring before fruits have developed. Needlegrasses are grazed in the fall only if the fruits are softened by rain. Needleandthread is moderately important spring forage for mule deer, but use declines considerably as more preferred forages become available.

Site Characteristics

Needleandthread grass is common on dry hills and plains, and on stony and sandy soils throughout its range. Needleandthread grass is found at elevations between 3,000 and 9,200 feet and requires about 5 to 18 inches of precipitation annually. Needleandthread is common and widespread throughout the state and certain to be in every county.

Soils

Needleandthread grows on sandy or loamy, well-drained soils with usually a slightly high pH, low water-holding capacity, low clay percentage and high bulk density.

JUBA *Juncus balticus* baltic rush

Fire Effects

Baltic rush is fire tolerant when dormant and

top-killed by fire during the growing season. It establishes after fire through seed and/or lateral spread by rhizomes.

Grazing Effects

Baltic rush is described as a fair to good forage species for cattle. On average, Baltic rush's palatability is considered medium to moderately low. Baltic rush is considered palatable early in the growing season when plants are young and tender, but as stems mature and toughen palatability declines. Baltic rush tend to be resistant to grazing pressure and is generally described as an increaser under grazing pressure. Baltic rush provides food for several wildlife species and waterfowl. Baltic rush is an important cover species for a variety of small birds, upland game birds, birds of prey, and waterfowl.

Site Characteristics

Baltic rush occurs from sea level to subalpine zones in mountain habitats as well as in wet areas of deserts in wet meadows, along streambanks, rivers, lakes, ponds, bogs, sloughs, freshwater and brackish marshes and sometimes in dry flats and meadows. It occurs most abundantly at low to mid elevations, but can occasionally be found in the subalpine spruce-fir zone. Baltic rush can be found at elevations between 1,600 to greater than 8,000 feet with a wide range in precipitation. Baltic rush is common and widespread throughout the state.

Soils

Baltic rush generally grows on poorly-drained sandy to silt loam soils, often with a thick organic layer. It is adapted to coarse, medium, and fine textured soils. Baltic rush is well adapted to alkaline soils and environments.

JUNCU *Juncus* rush

Fire Effects

Rush is top-killed by fire, with rhizomes and seeds protected by insulating soil.

Grazing Effects

Rush is described as a fair to good forage species for cattle. Rush has been identified in several studies as a source of food for several wildlife species.

Site Characteristics

Rush occurs from sea level to subalpine zones in mountain habitats as well as in wet

areas of deserts in wet meadows, along streambanks, rivers, lakes, ponds, bogs, sloughs, freshwater and brackish marshes and sometimes in dry flats and meadows. It occurs most abundantly at low to mid elevations, but can occasionally be found in the subalpine spruce-fir zone.

Soils

Rush generally grows on poorly-drained sandy to silt loam soils, often with a thick organic layer. It is adapted to coarse, medium, and fine textured soils.

LECI4 *Leymus cinereus* basin wildrye

Fire Effects

Basin wildrye is top-killed by fire. Older basin wildrye plants with large proportions of dead material within the perennial crown can be expected to show higher mortality due to fire than younger plants having little debris. Basin wildrye is generally tolerant of fire but may be damaged by early season fire combined with dry soil conditions.

Grazing Effects

The early growth and abundant production of basin wildrye make it a valuable source of forage for livestock. It is important forage for cattle and is readily grazed by cattle and horses in early spring and fall. Though coarse-textured during the winter, basin wildrye may be utilized more frequently by livestock and wildlife when snow has covered low shrubs and other grasses. Basin wildrye is intolerant of heavy or repeated grazing, especially if grazed before reaching maturity. Basin wildrye provides winter forage for mule deer, though use is often low compared to other native grasses. Basin wildrye provides summer forage for black-tailed jackrabbits. Because basin wildrye remains green throughout early summer, it remains available for small mammal forage for longer time than other grasses.

Site Characteristics

Basin wildrye is found on dry to moist sites, often occurring on bottomlands and uplands where lateral drainage and soil water are high. Basin wildrye is commonly found on floodplains, prairies and foothills with gentle to moderate slopes, and along streams, gullies, and roadsides. Basin wildrye can be found at elevations between 3,400 to 8,000 feet. Basin wildrye occurs on sites with 11

inches annual precipitation, but may be adapted to sites receiving 5 to 20 inches. Basin wildrye is common and widespread throughout the state.

Soils

Basin wildrye is commonly found on low lying areas with deep, well-drained soil although it may also grow on poorly drained soil. Basin wildrye may be intolerant of shallow soils and does not perform well on deep, coarse soils, though it is adapted to a wide range of other soil types. It is found on fine-textured, calcareous clay soils with claypan layers around 17 inches deep, and on sandy to gravelly soils. It experiences optimal growth on silty and clayey soils. Basin wildrye generally prefers deeper soils with higher effective rooting depth and/or greater effective moisture content than adjacent areas.

LETR5 *Leymus triticoides* creeping wildrye

Fire Effects

Creeping wildrye is top-killed by fire. Creeping wildrye is generally tolerant of fire but may be damaged by early season fire combined with dry soil conditions.

Grazing Effects

Creeping wildrye can be used for forage and is very palatable to all livestock. Once established it is very rhizomatous and maintains stands for many years. Creeping wildrye resists trampling and recovers well from grazing. Creeping wildrye is used for forage for many wildlife species and is often used for cover.

Site Characteristics

Creeping wildrye occurs in dry to moist places in valley bottoms, often in saline meadows at elevations between 4,000 and 8,800 feet and precipitation ranging from 8 to 12 inches. Creeping wildrye is common and widely scattered throughout the state.

Soils

Creeping wildrye grows on fine, medium and coarse textured soils with a pH between 6.0 and 9.0. Creeping wildrye has a high calcium carbonate tolerance.

MUPO2 *Muhlenbergia porteri* bush muhly

Fire Effects

Bush muhly regenerates following fire from

soil-stored seed. Fire probably top-kills bush muhly. Burning causes at least short-term decline of bush muhly. Recovery time is thought to vary considerably and is probably dependent on post fire weather and competition.

Grazing Effects

Bush muhly is readily eaten by livestock throughout the year when available; however, it is usually not abundant enough to provide much forage. It is grazed heavily in winter when other species become scarce. Because of its branching habit, it is extremely susceptible to heavy grazing. When growing beneath shrubs, the shrubs may provide some protection from large herbivores. The palatability of bush muhly for wildlife species is rated fair to poor.

Site Characteristics

Generally, bush muhly grows on low elevation semidesert grassland ranges in good condition, as well as in deserts. It occurs on mostly rocky or sandy sites on lower plains, dry mesas, canyons, foothills, and open hillsides from 2,500 to 6,000 feet and precipitation ranging from 5 to 12 inches. Bush muhly is known in southern Nevada only, from Red Mountain and Reveille Range to West Spotted Range, Nye County; south to the Virgin, Muddy, McCullough, Newberry and River Mountains, Clark County.

Soils

Bush muhly grows on fine, medium and coarse textured soils with a pH between 6.2 and 8.0. Bush muhly has no tolerance for calcium carbonate.

MURI *Muhlenbergia richardsonis* mat muhly

Fire Effects

Mat muhly is top killed by fire. Fire does not harm mat muhly to any great extent because the rhizome buds are insulated by the soil.

Grazing Effects

Young mat muhly is readily eaten by livestock. Plants become less palatable as they mature. Mat muhly plants usually grow in scattered patches, so they are seldom sufficiently abundant to be of major importance to livestock. In the northern part of its range, mat muhly is rated as good to very good forage for cattle and horses and fairly good for domestic sheep. Mat muhly

withstands heavy grazing because of its sod-forming habit. The palatability of mat muhly for wildlife species has been rated as fair to poor.

Site Characteristics

Mat muhly grows from moist lowlands to mountain meadows, and rocky slopes. In the eastern parts of its range mat muhly is found on wet, gravelly soil. Plants are occasional on open slopes from 5,000 to 9,200 feet. In the Sierra Nevada, mat muhly dominates on high-elevation sites (10,200 to 11,700 feet) with very thin soils at precipitations ranging from 10 to 19 inches. Mat muhly is common throughout the state.

Soils

Mat muhly often grows on alkaline soil with textures ranging from sand or gravel to clayey loam. It is one of the more salt-tolerant upland grasses, sometimes forming mixed stands with halophytic species.

PHAU7 *Phragmites australis* common reed

Fire Effects

Common reed stands are typically dense and contain much dead material. Standing dead canes and litter often constitute twice as much biomass as living shoots. This abundant dead fuel carries fire well, allowing stands to burn during midsummer when the current year's shoots are green. Common reed's rhizomes are deeply buried in soil and are often under water as well. The heat from most fires does not penetrate deep enough into the soil to injure these regenerative structures. When fire consumes the aboveground foliage, new top-growth is initiated from the surviving rhizomes.

Grazing Effects

Common reed is moderately tolerant of grazing, but prolonged heavy grazing tends to reduce the extent and size of stands. Common reed provides shade, nesting, and cover habitat for mammals, waterfowl, song birds, and fishes. Common reed is not rated as a high-value wildlife food unless plants are young.

Site Characteristics

Common reed grows on level ground in freshwater marshes, oxbow lakes, swales, and backwater areas of river and streams. It also grows around springs and along pond

and lake margins, streambanks, and irrigation ditches at elevations between 2,200 and 6,700 feet and precipitation ranging from 3 to 10 inches. Common reed is common throughout western and southern Nevada.

Soils

Common reed grows on most soil textures from fine clays to sandy loams and is somewhat tolerant of saline or alkaline conditions.

PLJA *Pleuraphis jamesii* galleta

Fire Effects

Galleta is a rhizomatous perennial which can resprout after top-kill by fire.

Grazing Effects

When actively growing, galleta provides good to excellent forage for cattle and horses and fair forage for domestic sheep. Although not preferred, all classes of livestock may use galleta when it is dry. Domestic sheep show greater use in winter than summer months and typically feed upon central portions of galleta tufts, leaving coarser growth around the edges. Galleta is generally classified as a decreaser in northern deserts and an increaser in southern deserts. Galleta provides moderately palatable forage when actively growing and relatively unpalatable forage during dormant periods. Galleta provides poor cover for most wildlife species.

Site Characteristics

Galleta prefers arid and slightly mesic habitats, with competitive abilities decreasing as moisture availability increases. Galleta will inhabit areas receiving the majority of annual precipitation either in summer, or winter and fall. Galleta can be found at elevations between 3,600 and 6,000 feet and precipitation ranging from 5 to 12 inches. Galleta is common and widespread throughout the state, except for the northwest corner reaching the northwestern range limit of the species just south of Fernley, Churchill County.

Soils

Galleta is adapted to alkaline soils, both saline and fresh and will grow in fine to coarse textured sandy, loam, and clay soils.

PLRI3 *Pleuraphis rigida* big galleta

Fire Effects

Fire most likely top-kills big galleta. Big galleta sprouts from rhizomes following fire. Damage to big galleta from fire varies, depending on whether big galleta is dormant when burned. If big galleta is dry, damage may be severe. However, when plants are green, fire will tend to be less severe and damage may be minimal, with big galleta recovering quickly.

Grazing Effects

Big galleta is a coarse, nearly woody perennial bunchgrass that is considered to have only fair forage value for cattle, horses and domestic sheep. Its coarse, rigid culms make it relatively resistant to heavy grazing and trampling. In southern Nevada, big galleta is heavily utilized by bighorn sheep and in some blackbrush communities it is a preferred habitat. Mule deer utilize trace amounts of big galleta.

Site Characteristics

Big galleta is found on flat, sandy areas on limestone, rock hillsides, sand dunes, and along washes with saltbush, creosote bush, bursage, blackbrush, and pinyon-juniper at elevations between 2,000 and 4,400 feet. Big galleta is known in southern Nevada only, from the Ranger Mountains and Pahump Valley, Nye County; to Muddy, Pahroe and Pahrnagat Valleys, Lincoln County; south to Las Vegas and extending through the McCullough, Spring, Muddy, Virgin and Newberry Mountains, to east of Searchlight, Clark County.

Soils

Big galleta occurs on all soil textures, but displays poor growth on clays.

POA *Poa* bluegrass

Fire Effects

Bluegrass is generally unharmed by fire. It produces little litter, and its small bunch size and sparse litter reduces the amount of heat transferred to perennating buds in the soil. Its rapid maturation in the spring also reduces fire damage, since it is dormant when most fires occur.

Grazing Effects

Bluegrass increases under grazing pressure. Overgrazing and severe trampling are injurious to native stands of bluegrass and without proper protective grazing, a range will deteriorate rapidly.

Site Characteristics

Bluegrass occurs on flats and ridgetops, slopes, meadows, and open timberline. Bluegrass is found at elevations between 3,800 feet up to 9,500 feet and in rainfall belts varying from 6 inches up to 20 inches annually. It does best with cool winter moisture above 7,000 feet. Bluegrass is common throughout the state and is found in every county.

Soils

Bluegrass thrives on a variety of soils from moderately coarse sands to fine clays. It grows well in rich clay loam soils but most often inhabits shallow, rocky, or sandy soils. It will not grow under saline conditions and can tolerate weakly acid or alkaline soils.

POFE *Poa fendleriana* muttongrass

Fire Effects

Muttongrass is unharmed to slightly harmed by light to severity fall fire. Muttongrass appears to be harmed by and slow to recover from severe fire.

Grazing Effects

Muttongrass is excellent forage for domestic livestock especially in the early spring. Muttongrass begins growth in late winter and early spring, which makes it available before many other forage plants. Deer and elk make heavy use of muttongrass, especially in early spring when other green forage is scarce. Depending upon availability of other nutritious forage, deer may use muttongrass in all seasons. Muttongrass cures well and is an important fall and winter deer food in some areas.

Site Characteristics

Muttongrass can occur on relatively dry sagebrush valleys and foothills to wooded areas at middle elevations, but typically grows from the pinyon-juniper belt, through the ponderosa pine and aspen types, to the Engelmann spruce-lodgepole zone at elevations between 3,600 and 10,500 feet with precipitation between 8 and 20 inches. Muttongrass is common throughout most of Nevada but not known in the northwest corner.

Soils

Although muttongrass grows most commonly on well-drained, rich clay loams, it also inhabits drier, less fertile, shallow, gravelly or sandy soils on open hillsides.

POSE *Poa secunda* Sandberg bluegrass

Fire Effects

Sandberg bluegrass is generally unharmed by fire. It produces little litter, and its small bunch size and sparse litter reduces the amount of heat transferred to perennating buds in the soil. Its rapid maturation in the spring also reduces fire damage, since it is dormant when most fires occur.

Grazing Effects

Sandberg bluegrass is a palatable species, but its production is closely tied to weather conditions. It produces little forage in drought years, making it a less dependable food source than other perennial bunchgrasses. Sandberg bluegrass increases under grazing pressure. Overgrazing and severe trampling are injurious to native stands of Sandberg bluegrass and without proper protective grazing, a range will deteriorate rapidly. When properly managed, Sandberg bluegrass will compete with cheatgrass. Sandberg bluegrass is desirable for pronghorn and mule deer in the spring and preferable in the spring, summer, and fall for elk and desirable as part of their winter range.

Site Characteristics

Sandberg bluegrass occurs on flats and ridgetops, slopes, meadows, and open timberline. Sandberg bluegrass is found at elevations between 3,800 feet up to 9,500 feet and in rainfall belts varying from 6 inches up to 20 inches annually. It does best with cool winter moisture above 7,000 feet. Sandberg bluegrass is common throughout the state and is found in every county.

Soils

Sandberg bluegrass thrives on a variety of soils from moderately coarse sands to fine clays. It grows well in rich clay loam soils but most often inhabits shallow, rocky, or sandy soils. It will not grow under saline conditions and can tolerate weakly acid or alkaline soils.

PSSPS *Pseudoroegneria spicata* ssp. *spicata* bluebunch wheatgrass

Fire Effects

Burning bluebunch wheatgrass may remove most of the aboveground biomass but does not usually result in plant mortality. Bluebunch wheatgrass is generally favored

by burning. Burning stimulates flowering and seed production. However, season of burning affects mortality.

Grazing Effects

Bluebunch wheatgrass is considered one of the most important forage grass species on western rangelands for livestock. Although bluebunch wheatgrass can be a crucial source of forage, it is not necessarily the most highly preferred species. Bluebunch wheatgrass is moderately grazing tolerant only during its nongrowing period. Lightly grazed plants produce higher growth than ungrazed plants. Bluebunch wheatgrass cannot withstand heavy continuous grazing. The growing point of bluebunch wheatgrass is fairly high and thus can easily be overgrazed. Bluebunch wheatgrass is considered one of the most important forage grass species on western rangelands for wildlife. Bluebunch wheatgrass does not generally provide sufficient cover for ungulates, however, mule deer are frequently found in bluebunch-dominated grasslands.

Site Characteristics

Bluebunch wheatgrass is found at elevations between 4,800 and 8,000 feet. On native sites, bluebunch wheatgrass is most abundant in the 8 to 20 inch annual precipitation zones. Bluebunch wheatgrass is common throughout the state.

Soils

Bluebunch wheatgrass does best on medium to coarse-textured soils and can be found on heavy to medium to coarse-textured soils over 10 inches deep including fairly sandy sites. It can be seeded on clayey sites. It can be found on thin, rocky sites and on very steep slopes. Bluebunch wheatgrass can tolerate weakly saline conditions.

SCRIP *Scirpus* bulrush

Fire Effects

Bulrush can survive fire by sprouting from rhizomes.

Grazing Effects

Bulrush herbage production is high, but forage value is low. It is seldom grazed by livestock if other forage is available. If upland forage becomes limited and soil conditions dry, livestock may utilize bulrush. The hard-coated seeds of bulrushes are one of the most important and most

commonly used foods of ducks and of certain marsh birds and shorebirds. The stems and underground parts are eaten by muskrats and geese. Bulrushes also furnish important nesting cover for waterfowl as well as for marsh wrens and blackbirds and give concealing protection to muskrats, otters, raccoons and other animals.

Site Characteristics

Bulrush sites occurs on level, to nearly level, landscapes immediately adjacent to springs, seeps, sloughs or ponds.

Soils

Soils associated with bulrush are deep alluvium derived from mixed rock sources. These soils are high in organic material. Textures are sandy loams to silt loams. Soils are very poorly drained and are ponded during through at least the early summer.

SPAI *Sporobolus airoides* alkali sacaton

Fire Effects

Records of fire occurrence in sacaton grasslands are rare. Alkali sacaton is classified as tolerant of, but not resistant to fire. Top-killing by fire is probably frequent, and the plants can be killed by severe fire.

Grazing Effects

Alkali sacaton is a valuable forage species in arid and semiarid regions. Plants are tolerant to moderate grazing and can produce abundant herbage utilized by livestock. Alkali sacaton is tolerant to moderate grazing and can produce abundant herbage. The western salt desert shrub and grassland communities where alkali sacaton is common support an abundance of mule deer, pronghorn, carnivores, small mammals, birds, amphibians, and reptiles.

Site Characteristics

Alkali sacaton is common in moist alkaline flats, at elevations between 2,200 and 5,400 feet and precipitation ranging from 4 to 13 inches. Alkali sacaton is common and widespread throughout the state and probably in every county.

Soils

Alkali sacaton grows in saline and nonsaline soils, sometimes in dense, pure stands. It has a broad pH and salinity tolerance.

SPCO4 *Sporobolus contractus* spike dropseed

Fire Effects

Similar to SPCR

Grazing Effects

Similar to SPCR

Site Characteristics

Spike dropseed occurs on dry mesas, bluffs and sandhills at elevations between 2,500 and 6,000 feet. Spike dropseed is found in southern Nevada only, from Crystal Springs, Pahranaagat Valley and Panaca, Lincoln County; Big Smokey Valley, Nye County; south to the McCullough Mountains, Clark County.

Soils

Similar to SPCR

SPCR *Sporobolus cryptandrus* sand dropseed

Fire Effects

Sand dropseed is usually killed or top killed by fire. Individual plants are badly damaged to completely killed by fire, with younger plants suffering less than older plants. Sand dropseed has the potential for post fire regeneration and seedling establishment as seeds within burned areas may remain viable.

Grazing Effects

Sand dropseed provides fair to good forage for livestock. Sand dropseed's value as livestock forage is regional and dependent upon season. If fall rains are adequate, sand dropseed may have a period of renewed growth, producing new shoots in old sheaths. The persistent green base throughout winter makes sand dropseed an important desert winter range plant. In general, sand dropseed provides fair winter forage for domestic sheep and is most preferred by cattle of dune rangelands. Sand dropseed's responses to grazing are variable, with increases, decreases and no changes reported. Sand dropseed provides poor forage for wildlife. Large mammals in general show little use of sand dropseed. Sand dropseed is not preferred by pronghorn, elk, and deer. Small mammals and birds utilize sand dropseed to a greater extent than large mammals.

Site Characteristics

Although sand dropseed prefers well-drained and permeable soils, populations are not restricted. Areas subjected to seasonal flooding are also inhabited by sand

dropseed. Sand dropseed occurs under cottonwoods within intermittent streambeds and upland areas of playa lakes. Sand dropseed is found at elevation between 2,000 and 7,200 feet, and with precipitation between 5 to 15 inches annually. Sand dropseed is common throughout the state except for the north central counties.

Soils

Sand dropseed commonly grows on sandy soils but is adapted to medium textured soils also. It is found also, but to a lesser extent, on gravelly, stony, and cobbly sandy loams. Sand dropseed is not tolerant of wet soils.

SPFL2 *Sporobolus flexuosus* mesa dropseed

Fire Effects

Desert grasslands with mesa dropseed were probably characterized by frequent fire. Mesa dropseed is damaged by fire, but its susceptibility relative to other grasses, and its period of recovery, are poorly understood. Research is badly needed on fire's effects on mesa dropseed.

Grazing Effects

Mesa dropseed provides yearlong forage for cattle. Use is heaviest during the summer when the plant is actively growing. Mesa dropseed becomes unpalatable and low in nutrition at maturity. Mesa dropseed survives long droughts with grazing and can reduce grazing stress on black grama during the growing season. Adjusting grazing regimes to the amount and timing of rainfall can prevent overgrazing of mesa dropseed. Black-tailed jackrabbits and pronghorns also consume mesa dropseed.

Site Characteristics

Mesa dropseed is found on open areas, sandy deserts often with wolfberry, creosotebush, bursage, sagebrush and saltbush at elevations between 1,500 and 7,000 feet and with mean annual precipitation of 12 inches or less; it can survive in areas with as little as 6 to 7 inches. Mesa dropseed is scattered throughout much of the state, from as far north as Baltazar Hot Springs, Humboldt County; to Eastgate and Sand Mountain, Churchill County; to just west of Blair Junction, Esmeralda County; through Nye County; southward to Pahranaagat Valley, Lincoln County; to the McCullough and

Black Mountains, Clark County.

Soils

Mesa dropseed occurs on well-drained sand, sandy loams, loamy sands and gravelly soils.

TRMU *Tridens muticus* slim tridens

Fire Effects

A moderately hot fire will kill the aboveground portions of slim tridens, but survival of the rhizomes is usually good. Extremely hot fires will cause much more damage, especially among thin grasses not well protected by the buildup of vegetative material. The types of habitats in which it occurs are not usually subject to such extreme fires because the fuel loading is usually low, and sparse grasses are often the main carriers of fire.

Grazing Effects

Slim tridens is palatable and moderately nutritious. It is eaten by all classes of livestock, but is too scattered and low in abundance to be an important forage species. Abundance of slim tridens indicates fair to poor range condition. It is eaten by mule deer and other herbivores, and collared peccary but is too scattered and low in abundance to be an important forage species. Seeds are a source of food for rodents and birds.

Site Characteristics

Slim tridens occurs on dry plains, gravelly slopes, canyons and rocky hills at elevations between 2,400 and 5,000 feet. It tends to reach higher densities on the slightly wetter sites. Slim tridens is known in southern Nevada only, from Muddy Valley, Lincoln County; Mercury townsite to Bare Mountain, Nye County; to the Hoover Dam area, Searchlight and extending into the McCullough, Muddy and Spring Mountains, Clark County.

Soils

Slim tridens is adapted to well-drained, calcareous and rocky, sandy or clay soils.

TYPHA *Typha latifolia* common cattail

Fire Effects

Common cattail rhizomes are buried in the soil and are often under water where they cannot be harmed by the heat of fire. When above ground foliage is consumed by fire, common cattail quickly initiates new top-growth from these surviving underground

regenerative organs.

Grazing Effects

Common cattail is generally considered poor livestock forage. These animals rarely graze common cattail unless upland forage becomes scarce. Common cattail rootstocks are much more valuable as food for wildlife than are the seeds. Geese and muskrats use the starchy underground stems a great deal. Cattails also provide valuable shelter and nesting cover for several species of songbirds. For ducks, cattails have relatively little value. They furnish cover but they also take the place of more useful plants that would furnish both food and cover.

Site Characteristics

This site occurs on level, to nearly level, landscapes immediately adjacent to springs, seeps, sloughs or ponds.

Soils

Soils associated with common cattails are deep alluvium derived from mixed rock sources. These soils are high in organic material. Textures are sandy loams to silt loams. Soils are very poorly drained and are ponded during through at least the early summer. This site offers free water much of the year from seeps, springs or adjacent water bodies.

SHRUBS

ACGR *Acacia greggii* catclaw acacia

Fire Effects

Catclaw acacia is typically top-killed by fire. Following top-kill by fire, catclaw acacia sprouts from the base. Resprouting also occurs after flooding.

Grazing Effects

Catclaw acacia is typically grazed in the spring or when new growth is available, but animal densities and availability of other forage also affect livestock use of catclaw acacia. Utilization of catclaw acacia is typically restricted to spring when young twigs and leaves are available. Catclaw acacia is able to withstand heavy grazing pressure. Catclaw acacia provides food, shelter, nesting sites, and nesting material to a host of wildlife species. Catclaw acacia browsers include deer and rabbits. Both game and nongame bird species feed on catclaw acacia.

Site Characteristics

Catclaw acacia occupies dry gravelly mesas, canyons, arroyo banks, rocky hillsides,

desert flats, washes, floodplains, and riparian areas in arid to semiarid southwestern regions. Catclaw acacia is found at elevations between 800 and 3,900 feet and precipitation ranges from 8 to 20 inches. Catclaw acacia is known only in southern Nevada, where it is common, with its most northern known location north of the Clark County line, on the road to Alamo, Lincoln County; also known from the southern tip of Nye County; south to the Petrified Forest Canyon, west of Logan, to the Newberry and Spring Mountains, through the McCullough, Muddy and Virgin Mountains, Clark County.

Soils

The desert soils typical of catclaw acacia habitat are low in organic matter, can be slightly acidic to slightly alkaline, are often shallow, and commonly contain calcium carbonate in the upper 6.6 feet (2 m) of soil. The calcic layer can be thick and impenetrable.

ACSH *Acamptopappus shockleyi*

Shockley's goldenhead

Fire Effects

No information available.

Grazing Effects

Sheep browse goldenhead when better forage is unavailable.

Site Characteristics

Shockley's goldenhead occurs in dry, desert flats and washes to rocky fans and slopes, often occurring with horsebrush, wolfberry, creosotebush, and white bursage at elevations between 2,500 and 5,800 feet. Shockley's goldenhead is locally abundant from southern Nevada, north to southeast of Sodaville, Mineral County; Candelaria, Mineral County; through the Bullfrog Hills and Goldfield Hills, Nye County; to the Tule Desert, Lincoln County; south to the Spring Mountains, to the Spotted Range, to the McCullough and Muddy Mountains, Clark County.

Soils

Goldenhead is found in Alfisol, Aridisol, and Mollisol soil types.

AGUT *Agave utahensis* Utah agave

Fire Effects

Fire has an impact on agave populations. Depending on time of year, duration, season

of burn and frequency of burn, fire could create a nutrient rich agave seedbed, but could also eliminate shade needed for seedlings; fire could be good for short-lived grasses, detrimental for long-lived agaves; fire can minimize competition between grasses and agave for water and nutrients, but expose young agave to harsh environmental conditions.

Grazing Effects

No information available.

Site Characteristics

Utah agave occurs in canyons, dry slopes and exposed ridges of limestone on mountain ranges from sagebrush to pinyon-juniper zones at elevations between 4,000 and 7,000 feet and precipitation ranging from 8 to 16 inches. Utah agave is known in Nevada from southeastern Nye County to southern Lincoln and Clark Counties.

Soils

Utah agave grows on shallow, medium to coarse textured soils with a pH between 7 and 8.5. Utah agave has a high calcium carbonate tolerance.

ALWR *Aloysia wrightii* lemon verbena

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

Lemon verbena is common on dry, desert, rocky slopes, along washes and along the base of limestone hills with creosotebush and blackbrush at elevations between 2,600 and 3,800 feet. Lemon verbena is known in southern Nevada only, from the McCullough Mountains, to the south end of the Virgin Mountains, also the southeast slope of the north Las Vegas Range, Clark County.

Soils

Can be found on a variety of soils, along rocky slopes, ledges and limestone hills.

AMDU2 *Ambrosia dumosa* white bursage

Fire Effects

Fires in the desert are infrequent and of low severity because production of annual and perennial herbs seldom provides a fuel load capable of sustaining fire. Fire generally top-kills white bursage and resprouts after fire and flooding.

Grazing Effects

White bursage is of intermediate forage value. It is fair to good forage for horses and fair to poor for cattle and sheep. However, because there is often little other forage where white bursage grows, it is often highly valuable to browsing animals and is sensitive to browsing. White bursage is an important browse species for wildlife.

Site Characteristics

White bursage commonly grows on arroyos, bajadas, gentle slopes, valley floors and sand throughout the Sonoran and Mojave deserts. White bursage is found at elevations between 1,000 and 5,000 feet. White bursage is very common in the Mojave Desert of southern Nevada, extending north to northeast Yucca Flat below Banded Mountain, on the northern slope of Jackass Flats and on Thirsty Canyon uplands, on Obsidian Butte-Tolicha Peak area of north Sarcobatus Flats, Nye County.

Soils

White bursage occurs on a variety of soils.

AMER *Ambrosia eriocentra* hollyleaf bursage

Fire Effects

Bursage species are easily top-killed but can resprout following fire.

Grazing Effects

Hollyleaf bursage has low forage value for livestock. Hollyleaf bursage has low forage value for wildlife.

Site Characteristics

Hollyleaf bursage occurs on dry, open slopes and bottoms of dry washes from the creosote zone up to the blackbrush and pinyon-juniper zones. Hollyleaf bursage can be found at elevations between 1,800 and 4,800 feet and precipitation ranging from 5 to 8 inches. Hollyleaf bursage is known in southern Nevada, where it is locally abundant from the northwest Spring Mountains, Nye County; to northwest Desert Valley, Lincoln County; south to the Spring Mountains, Newberry Mountains and the Muddy, Virgin and McCullough Mountains of Clark County.

Soils

Hollyleaf bursage grows in sandy, gravelly, or rocky soils.

AMUT *Amelanchier utahensis* Utah serviceberry

Fire Effects

Aboveground parts of Utah serviceberry may be killed or consumed under fire conditions with sufficient flame lengths. Utah serviceberry may be slightly harmed by fire, depending on moisture conditions, but is generally considered to be fire tolerant. Utah serviceberry sprouts from the root crown following fire. Soil moisture is important to aid sprouting.

Grazing Effects

In the spring, Utah serviceberry provides fair forage for cattle and good to excellent browse for domestic sheep and goats. Utah serviceberry provides good forage late in winter and in early spring, because it leafs out and blooms earlier than associated species. Utah serviceberry is a very important species for mule deer in the Great Basin. Porcupines and desert bighorn sheep also use Utah serviceberry. Utah serviceberry fruit is preferred by many birds. It can be an important winter food for birds since berries stay on the shrub throughout the winter. In Nevada, sage grouse eat the fruit of Utah serviceberry.

Site Characteristics

Utah serviceberry is common in the more arid areas in canyons, rocky areas, and foothills, usually between 5,000 and 9,000 feet in elevation with an annual precipitation between 15 and 21 inches. The older, taller, and densest stands occur at high-elevation sites with moist northern slopes and deep soils, but will grow well on southwest exposures. Utah serviceberry is very common and widespread throughout the state and is known in every county, but is infrequent in the northeast.

Soils

Utah serviceberry grows best on coarse to medium well-drained soils. It requires excellent drainage and is not salt tolerant.

ARNO4 *Artemisia nova* black sagebrush

Fire Effects

Black sagebrush communities generally lack enough fine fuels to carry a fire. In addition to low fine fuel loading, wide shrub spacing makes fire infrequent or difficult to prescribe in black sagebrush types. Black sagebrush is highly susceptible to fire-caused mortality; plants are readily killed by all fire intensities. Following burning,

reestablishment occurs through off-site sources.

Grazing Effects

Black sagebrush is a valuable browse plant for livestock. In winter, at lower elevations, black sagebrush is heavily utilized by domestic sheep. Cattle use of black sagebrush is greatest in fall and winter, with only trace amounts consumed in summer. Decreases in black sagebrush indicate a downward trend in grazing condition. Black sagebrush is a significant browse species within the Intermountain region. It is especially important on low elevation winter ranges in the southern Great Basin, where extended snow free periods allow animal's access to plants throughout most of the winter. In these areas it is heavily utilized by pronghorn and mule deer.

Site Characteristics

Black sagebrush is found on gentle, rocky slopes and windswept ridges in dry, shallow soils, in the foothills and desert mountain ranges at elevations between 5,000 to 11,000 feet with annual precipitation ranging between 7 and 18 inches. Black sagebrush is extremely common and widespread in Nevada found in every county.

Soils

Black sagebrush can grow in soils ranging from clayey to gravelly. It prefers soils that are dry, shallow, gravelly, and well drained. It is usually associated with soils underlain by caliche or impervious pans.

ARPU5 *Arctostaphylos pungens* pointleaf manzanita

Fire Effects

Fire effects to pointleaf manzanita vary with season, severity, and intensity and range from partial consumption to complete consumption of the aboveground plant. Pointleaf manzanita is dependent on fire for germination of its dormant, banked seed.

Grazing Effects

Pointleaf manzanita provides food and cover for livestock. Domestic goats prefer pointleaf manzanita and it will decrease under heavy browsing pressure by domestic goats. Pointleaf manzanita provides food and cover for wildlife. Many frugivorous animals eat the berries, including blue grouse, Gambel's quail, mule deer, American black bears, coyotes and skunks.

Palatability of pointleaf manzanita is considered low for deer species. Pointleaf manzanita stands are considered excellent cover for deer and desert bighorn sheep.

Site Characteristics

Pointleaf manzanita occurs on dry rocky slopes and mesas. Pointleaf manzanita typically occurs in areas where annual precipitation ranges from 10 to 30 and the precipitation has a bimodal distribution. Pointleaf manzanita occurs in chaparral and woodlands between 4,200 to 8,000 feet. Pointleaf manzanita is known to be in southern Nevada only, from the Mormon Mountains, Lincoln County; south to Wheeler Pass in the Spring Mountains, to the Virgin Mountains in Clark County.

Soils

Soils are usually gravelly sandy loams derived from granitic parent materials that are poorly developed, unstable, and coarse. Soils are generally acidic.

ARTRT *Artemisia tridentata ssp. tridentata* basin big sagebrush

Fire Effects

Fire return intervals in basin big sagebrush are intermediate between mountain big sagebrush (5 to 15 years) and Wyoming big sagebrush (10 to 70 years). A naturally wide variation in fire frequency in this system is expected. Big sagebrush is readily killed when aboveground plant parts are charred by fire. Prolific seed production from nearby unburned plants coupled with high germination rates enables seedlings to establish rapidly following fire.

Grazing Effects

Basin big sagebrush may serve as emergency food during severe winter weather, but it is not usually sought out by livestock. Excessive fall use by domestic sheep can sometimes kill basin big sagebrush. Basin big sagebrush is the least palatable of all the subspecies of big sagebrush. Basin big sagebrush is browsed by mule deer from fall to early spring, but is not preferred.

Site Characteristics

Basin big sagebrush grows in relatively more mesic habitats than other subspecies of big sagebrush. Basin big sagebrush is associated with deep, seasonally dry, well-drained soils on plains, valleys, and

foothills. Basin big sagebrush can be found at elevations between 2,000 and 7,000 feet with annual precipitation ranging between 5 to 18 inches.

Soils

Basin big sagebrush typically occurs on deep stratified sandy loam. Basin big sagebrush is an indicator of productive sites. Basin big sagebrush is considered intolerant of alkaline conditions, but some ecotypes do grow in association with salt-tolerant plants.

ARTRV *Artemisia tridentata ssp. vaseyana* mountain big sagebrush

Fire Effects

Presettlement fire return intervals in mountain big sagebrush communities varied from 15-25 years. Mountain big sagebrush is highly susceptible to injury from fire. Plants are readily killed in all seasons, even light severity fires. Mountain big sagebrush plants top-killed by fire will not resprout.

Grazing Effects

Mountain big sagebrush is eaten by domestic livestock but has long been considered to be of low palatability, and a competitor to more desirable species. Mountain big sagebrush can increase in response to excessive grazing. Mountain big sagebrush is highly preferred and nutritious winter forage for mule deer and elk.

Site Characteristics

Mountain big sagebrush occurs in mountain valleys and on foothills, slopes and high ridges at elevations between 5,000 and 10,000 feet where precipitation exceeds 12 inches. Mountain big sagebrush is extremely variable and is common in pinyon-juniper woodlands, throughout much of the state. Mountain big sagebrush's most southern known distribution is in the Toiyabe Range, Nye County.

Soils

Soils are moderately deep, well-drained, slightly acid to slightly alkaline and characterized by late-melting winter snow cover and summer moisture.

ATCA2 *Atriplex canescens* fourwing saltbush

Fire Effects

Fourwing saltbush is most common under regimes of infrequent fire and moderate browsing. Fire top-kills or kills fourwing

saltbush, depending upon ecotype. Fourwing saltbush may sprout after top-kill.

Grazing Effects

Fourwing saltbush is one of the most palatable shrubs in the West. Its protein, fat, and carbohydrate levels are comparable to alfalfa. It provides nutritious forage for all classes of livestock. Palatability is rated as good for domestic sheep and domestic goats; fair for cattle; fair to good for horses in winter, poor for horses in other seasons. Fourwing saltbush is adapted to browsing, and may show compensatory growth after stem removal. Old crown wood can produce vigorous sprouts after new growth is browsed; however, plants decline when subjected to overuse. Fourwing saltbush provides valuable habitat and year-round browse for wildlife. Fourwing saltbush also provides browse and shelter for small mammals. Additionally, the browse provides a source of water for black-tailed jackrabbits in arid environments. Granivorous birds consume the fruits. Wild ungulates, rodent and lagomorphs readily consume all aboveground portions of the plant. Palatability is rated good for deer, elk, pronghorn, and bighorn sheep.

Site Characteristics

Fourwing saltbush occurs on dry plains, hills, bluffs, valleys, and riparian corridors. It's found at elevations between 2,000 and 7,500 feet, with annual precipitation ranging from 6 to 14 inches. Fourwing saltbush is very common and widespread. It is known to be in every county except in Carson City and Eureka Counties. Fourwing saltbush is exceedingly less common from the central counties.

Soils

Fourwing saltbush is common on many different soil types, most common on deep, well-drained, sandy (often alkaline) soils in the desert and foothill ranges of the Great Basin. However, it also grows well on heavy clay and on selenium-enriched soil.

ATCO *Atriplex confertifolia* shadscale

Fire Effects

Shadscale is generally killed by fire. However, shadscale communities are usually unaffected by fire because of low fuel loads, although a year of exceptionally heavy winter rains can generate fuels by

producing a heavy stand of annual forbs and grasses. The mean fire return interval for shadscale communities range from 35 to 100 years. Increased presence of non-native annual grasses, such as cheatgrass, can alter fire regimes by increasing fire frequency under wet to near-normal summer moisture conditions.

Grazing Effects

Shadscale provides good browse for domestic sheep and goats. Shadscale leaves and seeds are an important component of domestic sheep and cattle winter diets. Shadscale tends to be browse tolerant. Heavy grazing during the winter and/or spring reduces shadscale. Die-off can also occur during extended periods of high precipitation. Shadscale is tolerant of early spring light-intensity browsing. Shadscale is a valuable browse species providing a source of palatable, nutritious forage for a wide variety of wildlife. The fruits and leaves are a food source for deer, desert bighorn sheep and pronghorn.

Site Characteristics

Shadscale occurs in arid climates that receive 4 to 8 inches of precipitation annually. It occurs on dry slopes, flat areas, ridges, and valley bottoms at elevations between 2,000 to 7,000 feet. Shadscale is common and widespread throughout the state and in every county except Douglas and Carson City.

Soils

Shadscale occurs on a variety of soils, varying from silt loams to coarse gravelly and stony silt loams where groundwater is below the rooting zone.

ATHY *Atriplex hymenelytra* desertholly

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

Desertholly occurs on dry, rocky slopes, on hillsides or washes with saltbush and creosotebush at elevations between 1,600 and 4,400 feet. Desertholly is common in southern Nevada only, from Ash Meadows, the north and west sides of Pahrump Valley, Nye County; south to Frenchman Mountain, Indian Springs, Spring Mountains, to the Spotted Range and Muddy Mountains, Clark

County.

Soils

Desertholly grows on stony or gravelly soils derived from limestone, alkaline or calcareous volcanic soils.

ATLE *Atriplex lentiformis* big saltbush

Fire Effects

Big saltbush can survive at least some fires. Post fire regeneration of big saltbush occurs through seed. Big saltbush produces an abundant amount of seed.

Grazing Effects

Big saltbush is used to some extent as livestock forage. Livestock browse the leaves of big saltbush, though toxicity of big saltbush may be a problem in some areas. Big saltbush is an important forage and cover species for wildlife. Leaves and seeds of big saltbush are eaten by many species including mule deer, pronghorn, small rodents, game birds, and insects. Dense stands of big saltbush provide excellent cover for several species.

Site Characteristics

Big saltbush occurs in valleys, along smaller waterways, including outwash bajadas, on floodplains, in alkaline flats and in saline areas. Big saltbush can be found at elevations between 500 and 3,500 feet. Big saltbush is known in southern Nevada only, from Cloverdale Ranch, Tonopah-Reese River Road, south to the banks of the Colorado River near the Newberry Mountains, to the Muddy and Virgin Mountains, Clark County; to the Muddy Valley of Lincoln County.

Soils

Big saltbush is typically found in moist to dry alkaline or saline soils, and has low tolerance for acidity. Big saltbush occurs in a variety of soil textures from quite coarse soils to silty clay loams.

ATPA3 *Atriplex parryi* Parry's saltbush

Fire Effects

Parry's saltbush is probably killed by fire. Following fire, Parry's saltbush regenerates from on and off-site seed sources.

Grazing Effects

Parry's saltbush is highly palatable to livestock. Parry's saltbush is highly palatable to wildlife.

Site Characteristics

Parry's saltbush can be found at elevations between 2,000 and 5,200 feet and precipitation ranging from 5 to 8 inches. Parry's saltbush is common and widespread in the south. Parry's saltbush can be found from Ash Meadows and Beatty, Nye County; to the northeast branch of Fish Lake Valley, Esmeralda County and in Clark County.

Soils

Parry's saltbush occurs on deep to very deep and somewhat poorly to well-drained soils. Surface soils are medium to moderately fine textured and normally less than 10 inches thick to the subsoil or underlying material. The upper portion of most of these soils is strongly salt and sodium affected.

ATPO *Atriplex polycarpa* cattle saltbush

Fire Effects

Cattle saltbush has low fire tolerance and thus is killed by fire. Cattle saltbush regenerates from on and off-site seed sources.

Grazing Effects

Cattle saltbush provides valuable forage for domestic livestock, equaling or nearly equaling the forage value of fourwing saltbush. It provides nutritious forage for all classes of livestock. Saltbush provides valuable habitat and year-round browse for wildlife. Palatability is rated good for deer, elk, pronghorn, and bighorn sheep.

Site Characteristics

Cattle saltbush is common in desert bottoms, washes, flats, and slopes on sandy areas with saltbush, creosotebush, seepweed and salt cedar. Cattle saltbush occurs at elevations between 2,000 and 3,800 feet and precipitation from 3 to 12 inches. Cattle saltbush is known in southern Nevada only, from the south end of the Specter Range, Nye County; to the Lower Muddy Valley, Lincoln County; south to Las Vegas, extending to the Virgin, Muddy and McCullough Mountains, Clark County.

Soils

Cattle saltbush grows on alkaline and sandy soils and has a high calcium carbonate tolerance.

ATSP *Atriplex spinifera* spinescale saltbush

Fire Effects

Spinescale saltbush is probably killed by fire. It regenerates from on and off-site seed sources.

Grazing Effects

No information available, however it's spiny nature probably deters grazing.

Site Characteristics

Soils

Spinescale saltbush grows in moderately alkaline soils.

ATTO *Atriplex torreyi* Torrey's quailbush

Fire Effects

Big saltbush produces abundant seeds and is demonstrably fire resistant. Big saltbush has been shown to have reduced flammability due to high moisture and ash contents. Big saltbush is likely to have the best chance of persistence when pre-fire plant moisture contents are high and fire severity and frequency are low.

Grazing Effects:

Torrey's saltbush is important and is used to some extent as livestock forage. Livestock browse the leaves of Torrey's quailbush. Leaves and seeds of Torrey's quailbush are eaten by many species. Mule deer and pronghorn browse the leaves. Small mammals such as rabbits and rodents have been reported to eat Torrey's quailbush. Dense stands of Torrey's quailbush provide excellent cover for several species.

Site Characteristics

Big saltbush is common mostly from north western, western and southern Nevada.

Soils

Torrey's quailbush grows on alkaline soils.

BAEM *Baccharis emoryi* Emory's baccharis

Fire Effects

Most fires kill Emory's baccharis.

Grazing Effects

Emory's baccharis has no value as forage for livestock. Emory's baccharis has no or little value as forage for wildlife.

Site Characteristics

Emory's baccharis occurs on roadsides, disturbed areas, pond borders and dry streambanks with creosotebush and saltgrass at elevations between 2,200 and 6,000 feet. Emory's baccharis is known in southern Nevada only, where it is common from

Pahrump Valley and Ash Meadows, Nye County; to northeast of Las Vegas, to the Spring Mountains, Clark County.

Soils

Abundant and native in many areas of moist to wet soils in Ash Meadows.

BASA2 *Baccharis sarothroides* desertbroom

Fire Effects

Desertbroom is killed by fire.

Grazing Effects

Desertbroom has low palatability for livestock and is only eaten in the absence of palatable forage. Desertbroom has low palatability for wildlife and is only eaten in the absence of palatable forage.

Site Characteristics

Desertbroom occurs on desert washes, near streams, or in salt marshes at elevations between 1,600 and 1,700 feet and precipitation from 2 to 10 inches.

Desertbroom is rare in Nevada, known only one mile west of Las Vegas Wash Ranger Station and extending into the Muddy Mountains, Clark County.

Soils

Desertbroom grows on alkaline soils and is adapted to coarse, medium and fine textured soils.

BEJU *Bebbia juncea* sweetbush

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

Sweetbush occurs on gravelly washes, mostly below limestone mountain ranges with creosotebush, hollyleaf bursage, and white burrobrush at elevations between 600 and 4,100 feet. Sweetbush is known from our southern desert ranges, below the western end of the Spring Mountains and below the Specter Range, to the Western Spotted Range, Nye County; south to the Newberry Mountains, Clark County.

Soils

Sweetbush occurs on alluvial soils from mixed rock sources.

CEIN7 *Cercocarpus intricatus* littleleaf mountain mahogany

Fire Effects

Littleleaf mountain mahogany is moderately damaged by fire and there is very little sprouting following fire. Littleleaf mountain mahogany occurs on harsh sites that are rarely burned by fire.

Grazing Effects

Cattle and sheep will feed on littleleaf mountain mahogany slightly in the winter, and is generally of minor significance to livestock. Littleleaf mountain mahogany is good winter browse for deer and elk.

Site Characteristics

Littleleaf mountain mahogany occurs in dry, rocky desert ranges, frequently mixed in with pinyon-juniper at elevations between 5,000 and 7,400 feet and precipitation ranging from 5 to 14 inches. Littleleaf mountain mahogany is uncommon in the southern and northeastern corners of the state and completely absent from the northwestern corner.

Soils

Littleleaf mountain mahogany is abundant on well-drained soils and is often found on rocky soils and slickrock.

CELEI4 *Cercocarpus ledifolius* var. *intercedens* curl-leaf mountain mahogany

Fire Effects

Curleaf mountain mahogany may depend on fire to reduce conifer competition and produce favorable soil conditions for seedling establishment. Individual curleaf mountain mahogany are severely damaged by fire. Because many dead branches persist in the crown and leaves are slightly resinous, curleaf mountain mahogany is probably very flammable. Curleaf mountain mahogany is a weak sprouter after a fire.

Grazing Effects

Some livestock use curleaf mountain mahogany in spring, fall, and/or winter but rarely in the summer. Many researchers indicate that curleaf mountain mahogany decreases with browsing; however, others suggest that on some soils, curleaf mountain mahogany may increase with browsing. Curleaf mountain mahogany provides food and cover for a variety of wildlife species. Curleaf mountain mahogany is highly palatable to deer. A variety of small mammals consume curleaf mountain mahogany seeds.

Site Characteristics

Curleaf mountain mahogany grows in scattered patches and in extensive pure stands on dry, rocky, steep slopes at elevations between 3,900 to 9,000 feet. The average annual precipitation in curleaf mountain mahogany habitats of western and central Nevada is 14 to 45 inches. Curleaf mountain mahogany is common and widespread throughout the state and is known in every county except Pershing County.

Soils

Curleaf mountain mahogany occupies sites with shallow to deep, well-drained, nutrient-poor, sandy loam soils with weak development. While a wide range of textures are tolerated, curleaf mountain mahogany is most common on dry, coarse-textured substrates.

CHLI2 *Chilopsis linearis* desert willow

Fire Effects

Desert willow primarily occurs in washes which rarely burn. It is able to sprout from the root crown following top-kill by fire. Desert willow survives by producing numerous root crown sprouts.

Grazing Effects

Livestock generally do not browse desert willow. It is consumed only when other forage is scarce. Use of desert willow by livestock generally indicates over browsing or overstocking of the range. Mule deer eat small quantities of the leaves and fruit. Various species of birds eat desert willow seeds. Hummingbirds are attracted to the showy flowers and feed on the nectar.

Site Characteristics

Desert willow primarily occupies dry washes, intermittent streams and other water courses, and moist canyons in deserts and mountain foothills. These sites generally have underground water available year-round. Desert willow is found at elevations between 1,600 and 6,000 feet. Desert willow is known only in southern Nevada, from the Meadow Valley Wash and the Mormon Mountains, Lincoln County, south to Moapa Valley to Cottonwood Springs, Spring Mountains, to the Newberry and Virgin Mountains, Clark County.

Soils

Desert willow occurs on soils that are well drained, neutral to basic and mildly saline.

Soils are mostly sandy to gravelly alluvium.

CHPA12 *Chrysothamnus paniculatus*
desert rabbitbrush

Fire Effects

Desert rabbitbrush is top-killed by moderate to severe fire. Desert rabbitbrush recovers well after fire by sprouting from the root crown. Desert rabbitbrush sprouts and seedlings are probably abundant the first years after fire.

Grazing Effects

Desert rabbitbrush provides an important source of browse for livestock, particularly in the late fall and early winter after more palatable species have been depleted. Desert rabbitbrush provides an important source of browse for wildlife, particularly in the late fall and early winter after more palatable species have been depleted. Desert rabbitbrush communities provide a home for many bird species.

Site Characteristics

Desert rabbitbrush is found along roadsides, streambanks, terraces, sandy washes, and dry rocky slopes and arroyos. Desert rabbitbrush is found at elevations between 3,900 and 11,800 feet. Desert rabbitbrush is commonly scattered throughout the state.

Soils

Desert rabbitbrush occurs on well drained alluvial soils.

CORA *Coleogyne ramosissima*
blackbrush

Fire Effects

Blackbrush stands are considered to be one of the most flammable native plant assemblages in the Mojave Desert and fire will start and spread easily due to the dense, close spacing nature and resinous foliage of blackbrush. Blackbrush stands are substantially decreased or eliminated by fire; fire usually kills blackbrush seeds and mature shrubs. Blackbrush is slow to reestablish, it is generally removed from the site for 25 to 30 years and in some cases may take 60 or more years to reestablish.

Grazing Effects

Blackbrush areas are economically important for winter grazing by domestic livestock, especially sheep. Blackbrush is considered poor forage during the spring, summer, and fall for domestic cattle, horses,

and domestic sheep. Blackbrush areas are economically important for winter grazing primarily for several wildlife species. Mule deer and bighorn sheep generally use the blackbrush vegetation type in winter.

Site Characteristics

Blackbrush typically occurs at elevations between 2,200 and 6,000 feet, and distribution is strongly related to differences in precipitation, temperature, and soils. The upper elevation limit may be set by colder air temperatures, while the lower limit may be determined by cold air draining from adjacent mountain slopes into the valley bottoms, or by low soil moisture. Average annual precipitation on blackbrush sites ranges from 4.5 to 11.5 inches. The greatest precipitation generally falls from November through March; April, June, and October are dry; May has variable precipitation; and July and August experience summer storms. Blackbrush stands occur on well-drained sites including alluvial and colluvial slopes, washes, valley bottoms, lowlands, and flatlands of mild slope, and derived from limestone, sandstone, gneiss, and basalt. Blackbrush is very common and widespread in southern Nevada from Nye County; to the Pahrnagat Range and central Groom Range, Lincoln County; south to the Newberry, McCullough, Virgin, Spring and Muddy Mountains in Clark County.

Soils

Soils supporting blackbrush are generally shallow, poorly developed, and coarse textured, often with abundant exposed rock and high sand content. These sites are also calcareous, moderately alkaline, and low in salinity with pH ranging from 7.8 to 8.5. Blackbrush has a low tolerance for salinity, excessive soil moisture, and impeded soil aeration. Blackbrush is abundant on shallow to very deep soils.

CRCA5 *Croton californicus* California croton

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

California croton is found along hillsides and valleys with creosotebush, bursage and beaver-tail cactus at elevations between

1,000 and 5,000 feet. California croton is rare in Nevada and is found only in the Virgin Mountains and Lake Mead area, Clark County.

Soils

California croton can be found in a variety of soils among sand dunes and other sandy sites.

ENCEL *Encelia* brittlebush

Fire Effects

Brittlebush is often top-killed or completely killed by fire. Following a fast-moving, low-severity fire brittlebush plants are mostly scorched. Only leaves and branches near the ground burn, leaving foliage on ultimate stems. Brittlebush is a good initial offsite colonizer of post fire communities via wind dispersed seed; it also has some ability to sprout from the root crown, which may be limited by intolerance of heat.

Grazing Effects

Brittlebush has no forage value for domestic livestock. Brittlebush is a browse species for mule deer and desert bighorn sheep.

Site Characteristics

Brittlebush is commonly found on dry, rocky or gravelly slopes and mesas. Brittlebush is restricted to climates with long periods of limited moisture. The total amount of precipitation can be quite variable as well as the seasonal pattern. Brittlebush is found at elevations between 800 and 3,900 feet. Brittlebush is common in the south, from Stewart, Pahrump and Amargosa Valleys, Nye County; south to Las Vegas Wash Range Station, River Mountains, to the Valley of Fire, Clark County.

Soils

Brittlebush occurs on shallow to very deep soils.

ENFA *Encelia farinosa* white brittlebush

Fire Effects

White brittlebush is often top-killed or completely killed by fire. Following a fast-moving, low-severity fire white brittlebush plants are mostly scorched. Only leaves and branches near the ground burn, leaving foliage on ultimate stems. White brittlebush is a good initial offsite colonizer of post fire communities via wind dispersed seed; it also has some ability to sprout from the root crown, which may be limited by intolerance

of heat.

Grazing Effects

White brittlebush has no forage value for domestic livestock. White brittlebush is a browse species for mule deer and desert bighorn sheep.

Site Characteristics

White brittlebush is commonly found on dry, rocky or gravelly slopes and mesas. White brittlebush is restricted to climates with long periods of limited moisture. The total amount of precipitation can be quite variable as well as the seasonal pattern. White brittlebush is found at elevations between 800 and 3,900 feet. White brittlebush is common in the south, from Stewart, Pahrump and Amargosa Valleys, Nye County; south to Las Vegas Wash Range Station, River Mountains, to the Valley of Fire, Clark County.

Soils

White brittlebush occurs on shallow to very deep soils.

ENFR *Encelia frutescens* bush encelia

Fire Effects

Bush encelia is often top-killed or completely killed by fire. However, information regarding the fire ecology of bush encelia is sparse. It is assumed that, like other desert encelias, it depends on off-site seed rather than on-site sprouts for regeneration following fire.

Grazing Effects

Bush encelia has no forage value for domestic livestock. In arroyo habitats of southwestern Utah, bush encelia is important to the desert tortoise as a source of succulent forage in periods of low moisture.

Site Characteristics

Bush encelia is found in upland areas of low hills and alluvial valleys in desert environments. Bush encelia also inhabits naturally disturbed areas such as drainage channels and areas with substrate alterations. Bush encelia is found at elevations between 800 and 3,700 feet and precipitation ranges from 2 to 8 inches. Bush encelia is known in southern Nevada only, from Lone Mountain, Esmeralda County; to Ash Meadows, Mercury and Amargosa Valley, Nye County; and south to the Newberry Mountains, Clark County.

Soils

Bush encelia is common on rocky slopes and on residual sands and gravels. The soils are highly alkaline and may be salt encrusted at the surface. It also occurs in spring and seepage areas of the Mojave Desert where the soils are moist year-round or are seasonally saturated.

ENVI *Encelia virginensis* Virgin River encelia

Fire Effects

Following fire, Virgin River encelia depends on off-site seed rather than on-site sprouts for regeneration.

Grazing Effects

Encelia has no forage value for domestic livestock. Virgin River encelia is important to the desert tortoise as a source of succulent forage in periods of low moisture. Encelia is a browse species for mule deer and desert bighorn sheep.

Site Characteristics

Virgin River encelia can be found at elevations between 1,600 and 5,600 feet and precipitation ranging from 7 to 12 inches. Virgin River encelia is uncommon and is known from Amargosa Valley, to the Specter Range and Central Reveille Range in Nye County; south to the Spring Mountains and the Newberry, River Mountains and through the Muddy, Virgin and McCullough Mountains, Clark County.

Soils

Virgin River encelia grows on soils that are highly alkaline and may be salt encrusted on the surface.

EPCA2 *Ephedra californica* California ephedra

Fire Effects

California ephedra will often survive fire because the foliage does not readily burn.

Grazing Effects

California ephedra is important winter range browse for domestic cattle, sheep and goats. Mule deer, bighorn sheep, and pronghorn browse California ephedra, especially in spring and late summer when new growth is available.

Site Characteristics

California ephedra occurs in washes and mountainsides of limestone mountain ranges with creosotebush, saltbush, bursage and blackbrush at elevations between 2,200 and

4,000 feet. California ephedra is found in the Specter Range, where it is fairly common, to the Spotted and Halfpint Ranges, Skull and Yucca Mountains of Nye County; to the McCullough and Spring Mountains of Clark County.

Soils

California ephedra occurs primarily on gravelly or sandy soils.

EPNE *Ephedra nevadensis* Nevada ephedra

Fire Effects

Nevada ephedra is top-killed by fire. Underground regenerative structures commonly survive when aboveground vegetation is consumed by fire. Nevada ephedra generally sprouts after fire damages aboveground vegetation and may increase in plant cover.

Grazing Effects

Nevada ephedra is important winter range browse for domestic cattle, sheep and goats. Nevada ephedra is usually grazed heavily and seems to be perfectly safe for grazing livestock, since it induces no toxicity in ewes or cows, nor congenital deformities in lambs. Mule deer, bighorn sheep, and pronghorn browse Nevada ephedra, especially in spring and late summer when new growth is available. Mountain quail eat Ephedra seeds.

Site Characteristics

Nevada ephedra is commonly found on ridgetops as well as upper and lower slope positions at elevations between 2,500 and 6,000 feet with annual precipitation of approximately 7 inches. It also grows well in floodplain areas. Nevada ephedra is the most common and widely distributed ephedra species in the state, occurring in every county.

Soils

Nevada ephedra is associated with shallow, rocky soils. Nevada ephedra has a high saline tolerance and is common on the margins of salt deserts. However, it has no tolerance for acidity.

EPTO *Ephedra torreyana* Torrey's ephedra

Fire Effects

Torrey's ephedra has medium fire tolerance and is similar to Nevada ephedra.

Grazing Effects

Torrey's ephedra is important winter forage for cattle and sheep. Torrey's ephedra is moderately palatable to all domestic livestock especially as winter browse. Torrey's ephedra is an important browse species for big game. Torrey's ephedra is moderately palatable to many big game species, especially as winter browse.

Site Characteristics

Torrey's ephedra grows on dry, open sites in valleys and on slopes, mesas, and foothills, particularly in the sagebrush, pinyon-juniper, and ponderosa pine zones at elevations between 1,500 and 5,000 feet and precipitation from 5 to 8 inches. Torrey's ephedra is common in the southern counties of Nye, Lincoln and Clark.

Soils

Torrey's ephedra occurs primarily on gravelly or sandy soils.

EPVI *Ephedra viridis* Mormon tea

Fire Effects

Fires are relatively uncommon in some Mormon tea communities due to insufficient fuels. Mormon tea has been found in plant communities with a wide range of fire return intervals, and has been found in ecosystems following large, stand replacing fires as well as small, patchy, erratic fires. Mormon tea establishes early after fire but with relatively low occurrence compared to mid- and late successional stages. Mormon tea generally sprouts vigorously from the roots or woody root crown after fire and rapidly produces aboveground biomass from surviving meristematic tissue. It is capable of reestablishing disturbed areas through seed.

Grazing Effects

Mormon tea is heavily browsed by livestock on winter range but only moderately or lightly browsed during other seasons. Mormon tea stems and twigs are nearly all within reach of grazing animals, and can serve as winter forage because they extend above the snow. Mormon tea is an important browse species for big game. It is heavily browsed by big game on winter range but only moderately or lightly browsed during other seasons.

Site Characteristics

Mormon tea is found on dry, rocky, open sites in valleys and washes, and on slopes, alluvial fans, mesas, and foothills. It is

typically found at elevations ranging from 3,000 to 7,500 feet though it has been reported at elevations up to 10,000 feet. Mormon tea has been reported growing on north, south, southwest, and west aspects. Average precipitation on sites supporting Mormon tea ranges from 8 to 15 inches. Mormon tea is common throughout the state and known in every county.

Soils

Mormon tea grows primarily on sandy, gravelly or rocky, well-drained, undeveloped soils. Soil parent material is often granitic. Mormon tea grows well on shallow, medium or deep soils and is tolerant of calcareous, weakly saline, moderately alkaline, slightly sodic soils. It is found on silty loam soils with low infiltration rates, but it is intolerant of wet, poorly drained sites.

ERCO40 *Ericameria compacta*

Charleston Mountain goldenbrush

Fire Effects

Charleston Mountain goldenbrush is usually top-killed by fire.

Grazing Effects

Charleston Mountain goldenbrush may be a source of browse for livestock, particularly in the late fall and early winter after more palatable species have been depleted. Charleston Mountain goldenbrush may be a source of browse for wildlife, particularly in the late fall and early winter after more palatable species have been depleted.

Site Characteristics

Sites occur on south-facing back slopes of mountains. Elevations range from 8,000 to 11,000 feet.

Soils

Soils tend to be shallow to very shallow, somewhat excessively drained soils that formed in residuum and colluvium from limestone and dolomite.

ERFAP *Eriogonum fasciculatum* var. *polifolium* Mojave buckwheat

Fire Effects

Mojave buckwheat is vulnerable to hot fires. Resprout success is low and most regeneration is from seeds. Frequent fires deplete the seed bank, making populations vulnerable to extinction.

Grazing Effects

Mojave buckwheat has a browse rating of fair to poor for cattle.

Site Characteristics

Mojave buckwheat occurs in canyons and on dry mountain slopes and mesas at elevations between 1,700 and 5,900 feet and precipitation ranging from 8 to 11 inches. Mojave buckwheat occurs in southern Nevada from Esmeralda County to southern Nye County, southern Lincoln County; mainly just at the edge on the Great Basin and southward to Goodsprings and Las Vegas, Clark County.

Soils

Mojave buckwheat occurs on shallow soils often with a granitic substrate.

ERNA10 *Ericameria nauseosa* rubber rabbitbrush

Fire Effects

Rubber rabbitbrush is often top-killed by fire. Rubber rabbitbrush is a fire-adapted species that is typically unharmed or enhanced by fire. Recovery time is often rapid to very rapid. Rubber rabbitbrush is often one of the first species to colonize burned areas by sprouting or from off-site seed.

Grazing Effects

In general, livestock forage only lightly on rubber rabbitbrush during the summer, but winter use can be heavy in some locations. Fall use is variable, but flowers are often used by livestock. A few leaves and the more tender stems may also be used. Wildlife forage only lightly on rubber rabbitbrush during the summer, but winter use can be heavy in some locations. Fall use is variable, but flowers are often used by wildlife. A few leaves and the more tender stems may also be used. The forage value of rubber rabbitbrush varies greatly among subspecies and ecotypes.

Site Characteristics

Rubber rabbitbrush favors sunny, open sites throughout a wide variety of habitats including open plains, valleys, drainage ways, foothills, and mountains at elevations between 4,500 and 11,000 feet and precipitation ranging from 5 to 12 inches. It is particularly common on disturbed sites. Rubber rabbitbrush is common and widespread throughout the state and is known in every county.

Soils

Rubber rabbitbrush grows on a wide range of soils. Soils tend to be medium to coarse-textured and somewhat basic, but may range from moderately acidic to strongly alkaline. Rubber rabbitbrush is somewhat salt tolerant. Although rubber rabbitbrush often occurs on poor soils, it can also be found on some productive soils.

FAPA *Fallugia paradoxa* Apache plume

Fire Effects

Aboveground portions of Apache plume are top-killed by fire. It is classified as a survivor following fire. It exhibits vigorous sprouting from root suckers after fire.

Grazing Effects

Apache-plume is considered low to fair in palatability to livestock. However, in the southeastern part of its range and in winter it is considered important forage. It endures close grazing very well and shows excellent recuperative powers. Reports of its value as food to wildlife vary, but most sources rate it as fair or moderate. Reports of its value as food to wildlife vary, but most sources rate it as fair or moderate. There are no references in the literature describing its value as cover for large wildlife, but it does provide cover for small mammals and birds.

Site Characteristics

Apache plume is most commonly found restricted to washes, ephemeral waterways, and alluvial plains. Apache plume is found at elevations between 3,000 and 7,000 feet and requires only 8 to 20 inches of annual precipitation. Apache plume is common in southern Nevada, from the West Spotted Range at Red Mountain, and the northwest Spring Mountains, at Nye County; to near Pioche and also from the Groom Range and throughout the Mormon Mountains, Lincoln County; south to the Newberry Mountains, to the Spring, McCullough, Muddy and Virgin Mountains, Clark County.

Soils

Apache plume is found in dry, sandy, or gravelly soils. These soils can be derived from sandstone, limestone or basalt. Apache plume is tolerant of weakly saline and neutral to moderately basic soils.

FOSP2 *Fouquieria splendens* ocotillo

Fire Effects

Ocotillo bark contains resin and wax which allow it to burn easily. Its seeds probably do not survive for long in the soil and seedlings are not known to establish in recently burned areas. Ocotillo does sprout from the root crown following damage from fire, but its sprouting ability is probably dependent on fire severity. Fires that occur when ocotillo is leafless (as it is for much of the year) may be less harmful than those that occur when the plant is actively growing. Fires in general are not prevalent over much of the range of ocotillo.

Grazing Effects

Ocotillo has no forage value for livestock. Ocotillo increased under protection from livestock grazing. Ocotillo produces tannins which may help in its defense against herbivory. Habitats dominated or codominated by ocotillo are important to mule deer. Ocotillo is eaten by desert bighorn sheep.

Site Characteristics

Ocotillo is found at elevations between 650 and 2,800 feet. Ocotillo is infrequent to rare, known from the extreme southern tip of Nevada along Hwy 76 near the California/Nevada border; to the Dead Mountains, to along the Colorado River, Newberry Mountains, in Clark County.

Soils

Soils are generally rocky, shallow, and of limestone or granitic origin and are often underlain by caliche.

GRSP *Grayia spinosa* spiny hopsage

Fire Effects

Fires in spiny hopsage sites generally occur in late summer when plants are dormant, and sprouting generally does not occur until the following spring. Spiny hopsage is considered to be somewhat fire tolerant and often survives fires that kill sagebrush. Mature spiny hopsage generally sprout after being burned. Spiny hopsage is reported to be least susceptible to fire during summer dormancy.

Grazing Effects

Spiny hopsage is browsed by livestock in the fall, winter, and spring. Spiny hopsage provides a palatable and nutritious food source for livestock, particularly during late winter through spring. Domestic sheep browse the succulent new growth of spiny

hopsage in late winter and early spring. The large quantities of seeds produced are valuable for fattening domestic sheep. Spiny hopsage readily establishes and increases on overgrazed and denuded ranges. Spiny hopsage provides a palatable and nutritious food source for big game, particularly during late winter through spring.

Site Characteristics

Spiny hopsage grows on dry plains, deserts, and foothill slopes throughout its range. It is highly tolerant of drought at elevations between 2,600 and 6,900 feet and precipitation ranging from 8 to 12 inches. Spiny hopsage is common throughout the state and every county.

Soils

Spiny hopsage occurs on a wide range of soil textures from gravel, sand, and sandy loams to heavy clay, but it prefers sandy soils that are free of salt and hardpans. Spiny hopsage is fairly tolerant of alkaline and saline soils and is typically found on highly calcareous alkaline soils.

HODI *Holodiscus discolor* oceanspray

Fire Effects

Oceanspray is top-killed by fire. Oceanspray is only moderately resistant to fire, but is well adapted to disturbance by fire.

Oceanspray survives fire by regenerating from soil-stored seed or sprouting from surviving root crowns. Full recovery from a fire disturbance can be expected in 5 to 10 years.

Grazing Effects

Oceanspray is generally unpalatable to the majority of livestock. Oceanspray is generally unpalatable to the majority of big game; however bighorn sheep may browse this species in the summer. Plants are utilized by a variety of small bird species.

Site Characteristics

Oceanspray occurs at elevations between 4,500 and 9,500 feet and precipitation ranging from 12 to over 14 inches. This species has an apparent affinity for southern slopes which are usually warmer and drier. The overall environment is hot and dry and the growing season is long with a substantial drought developing by mid-summer.

Oceanspray is common and widely distributed throughout the state.

Soils

Oceanspray occurs on soils that are usually shallow and stony and have a relatively high pH of 5.8 to 6.8. Soils are generally thin and rocky or deep, heavy clay.

HYMO *Hymenoclea monogyra*
cheeseweed burrobrush

Fire Effects

Cheeseweed burrobrush is often top-killed by fire.

Grazing Effects

No information available.

Site Characteristics

Cheeseweed burrobrush occurs on alluvial fans, streams and sandy washes at elevations between 4,500 and 6,000 feet. Cheeseweed burrobrush is rare, reported from southern Washoe County, which is the northern most range limit of the species; probably also in Mineral and Esmeralda County.

Soils

Cheeseweed burrobrush generally grows on well-drained, sandy, alkaline soils.

HYSA *Hymenoclea salsola* white burrobrush

Fire Effects

Fires are infrequent in communities where white burrobrush occurs because of low productivity and discontinuous fuels; nevertheless, fire is a natural component of these communities. White burrobrush establishes after fire via off-site seeds and sprouting. Because it seeds prolifically, white burrobrush can quickly colonize burned sites.

Grazing Effects

No information available.

Site Characteristics

White burrobrush is commonly found in sandy washes, alluvial fans, and rocky slopes. White burrobrush is found at elevations between 700 and 6,400 feet. White burrobrush is common throughout the entire western and southern half of the state.

Soils

White burrobrush generally grows on well-drained, sandy, alkaline soils.

ISAC2 *Isocoma acradenia* alkali goldenbush

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

Alkali goldenbush occurs on gypsum flats or slopes, alkali sinks, shadscale scrub, Joshua tree woodlands, ditch banks, road sides and near river flood zones.

Soils

Alkali goldenbush grows on moist, calcareous, sandy or clay soils in alkaline or gypsum flats.

JUCOD *Juniperus communis* var. *depressa* common juniper

Fire Effects

Common juniper is generally killed or seriously damaged by fire. Patchy fires may allow individual plants to survive in protected areas such as on rocky cliffs. More rarely, portions of a lightly-burned plant may survive. The amount of damage this species incurs increases with increasing fire severity.

Grazing Effects

Domestic livestock rarely utilize common juniper. The foliage may be poisonous to domestic goats. Wild ungulates generally eat only trace amounts of common juniper. Deer typically browse common juniper during the winter or early spring. Common juniper can be important winter mule deer food.

Site Characteristics

Common juniper can grow on a wide range of sites. It grows on dry, open, rocky, wooded hillsides, sand terraces, maritime escarpments, and on exposed slopes and plateaus throughout its range at elevations from 6,000 to 10,000 feet with average annual precipitation between 20 and 60 inches. Common juniper grows primarily along the eastern border, from the Jarbidge Mountains, Elko County in the north; to Charleston Peak, Deer Creek, Clark Canyon and Lee Canyon, Spring Mountains in the south, Clark County.

Soils

Common juniper grows in deep to very deep soils of varying types, including acidic and calcareous sands, loams, or marls. It is tolerant of ultramafic soils.

KRER / (KRPA) *Krameria erecta* / *(Krameria parvifolia)* range ratany

Fire Effects

Range ratany is top-killed by fire. Range

ratany resprouts from the root crown after fire.

Grazing Effects

Range ratany is an important forage species for all classes of livestock. Palatability of range ratany is rated fair to good for cattle and sheep. Range ratany is an important forage species for deer. Mule deer browse range ratany year-long with seasonal peaks. Mule deer peak use is from February to April and from August to October.

Site Characteristics

Range ratany occupies open, sandy to rocky flats, bajadas, and playas. Range ratany inhabits areas where the winters are short and mild, and the summers are long and hot. Precipitation is received primarily in the fall and winter in the northern portion of its range and in the summer in the southern portion. The annual precipitation is 8 to 25 inches. Range ratany is found at elevations between 1,200 and 4,500 feet. Range ratany is locally common in southern and south eastern Nevada, from the Tule Desert, south eastern Lincoln County; to Moapa, Newberry Mountains, to Searchlight area; to Charleston Peak, Spring Mountains and the Muddy Mountains of Clark County.

Soils

Range ratany occurs on a variety of soil types.

KRGR *Krameria grayi* white ratany

Fire Effects

White ratany is partially or completely top-killed by fire. White ratany resprouts from the root crown after fire.

Grazing Effects

White ratany is important forage for all classes of livestock. White ratany decreases in response to grazing. Under heavy grazing pressure white ratany produces phenolic acids to reduce herbivory by reducing the palatability. White ratany is one of the most important browse species for mule deer and desert bighorn sheep. Black-tailed jack rabbits rely almost exclusively on white ratany during the winter.

Site Characteristics

White ratany occupies sandy to rocky flats, bajadas, and washes. White ratany inhabits the fringe between cool and warm deserts. In the northern portion of its range the precipitation is received primarily during the

winter, whereas in the southern portion it is received in the summer. The mean rainfall is 11 inches. White ratany is found at elevations between 600 and 4,200 feet.

White ratany is common in southern Nevada, at Mercury Valley to above Devils Hole, Ash Meadows, Nye County; to near Alamo, Lincoln County; south to the Newberry Mountains, to Boulder Dam area and south of Indian Springs, Spring Mountains, Clark County.

Soils

White ratany occurs on a variety of soil types.

KRLA2 *Krascheninnikovia lanata*
winterfat

Fire Effects

Prior to the invasion of exotic annuals, fire was an uncommon component of salt-desert shrub communities. Salt-desert communities dominated by winterfat produced little fine fuel. The introduction of annual grasses, including the highly flammable cheatgrass (*Bromus tectorum*), into these communities has altered fuel loads and fuel distribution. After wet years when annual grass production is high, salt-desert shrub communities are susceptible to fire. Fire drastically alters the community composition because salt-desert shrubs are not adapted to periodic fire. Winterfat is either killed or top-killed by fire, depending on fire severity. Severe fire can kill the perennating buds located several inches above the ground surface and thus kills the plant. In addition, severe fire usually destroys seed on the plant. Low-severity fire scorches or only partially consumes the aboveground portions of winterfat and thus does not cause high mortality.

Grazing Effects

Winterfat is an important forage plant for livestock in salt-desert shrub rangeland and subalkaline flats. Winterfat palatability is rated as good for sheep, good to fair for horses, and fair for cattle. Abusive grazing practices have reduced or eliminated winterfat on some areas even though it is fairly resistant to browsing. Grazing season has more influence on winterfat than grazing intensity. Early winter grazing may actually be beneficial. Winterfat is an important forage plant for wildlife in salt-desert shrub

rangeland and subalkaline flats. Animals that browse winterfat include mule deer, Rocky Mountain elk, desert bighorn sheep, and pronghorn.

Site Characteristics

Winterfat occurs in dry valley bottoms, on flat mesas, and on hillsides at elevations between 2,600 and 9,300 feet. Winterfat occurs in arid to semiarid climates with mean annual precipitation ranging from 5 to 20 inches. Winterfat is known in every county except Carson City and Douglas County.

Soils

It occurs on well-drained, calcareous soils with low to moderate salt concentrations. It is a halophytic species which excludes salt at the roots. It often occurs over compact and indurated calcic horizons. Soil texture apparently does not influence the distribution of winterfat.

LATR2 *Larrea tridentata* creosote bush

Fire Effects

Creosote bush is poorly adapted to fire because of its limited sprouting ability. Creosote bush survives some fires that burn patchily or are of low severity.

Grazing Effects

Many animals bed in or under creosote bush. Domestic sheep dig shallow beds under creosote bush because it provides the only shade in the desert scrub community. Creosote bush is unpalatable to livestock. Consumption of creosotebush may be fatal to sheep. Creosote bush is unpalatable to most browsing wildlife. Many small mammals browse creosote bush or consume its seeds. Desert reptiles and amphibians use creosote bush as a food source and perch site and hibernate or aestivate in burrows under creosote bush, avoiding predators and excessive daytime temperatures.

Site Characteristics

Creosote bush commonly grows on bajadas, gentle slopes, valley floors, sand dunes, and in arroyos. Creosote bush is found at elevations between 2,200 and 5,200 feet and annual rainfall averages 4 to 12 inches and is distributed bimodally. Creosote bush is extremely common and widespread throughout southern Nevada, north as far as 45 miles south of Tonopah, Nye County; west to Roosevelt Wells, Esmeralda County;

and east through the Tule Desert to Moapa Valley, Lincoln County, south through the Newberry River and Spring Mountains, extending to the southernmost tip of the state.

Soils

Creosote bush occurs on calcareous, sandy, and alluvial soils that are often underlain by a caliche hardpan.

LEFR2 *Lepidium fremontii* desert pepperweed

Fire Effects

There is little to no information in the regarding the immediate effect of fire on pepperweed plants.

Grazing Effects

Most domestic livestock generally do not prefer pepperweed as forage; however, domestic sheep and goats are known to graze thick stands of pepperweed in some areas. Cattle appear to occasionally browse desert pepperweed, but there seems to be no studies of its palatability. Pepperweed is apparently inferior food and cover for wildlife compared to native vegetation that it replaces.

Site Characteristics

Desert pepperweed is found in canyons and washes with creosotebush, blackbrush, saltbush, hopsage, wolfberry, burrobrush and yucca at elevations between 1,500 and 6,000 feet. Desert pepperweed is widespread throughout the state except in the north eastern corner; from throughout the north western counties; through the Toquima Range and Ash Meadows, to the Grapevine Mountains, and north Pahrump Valley to Sarcobatus Flat, Nye County; to the White Mountains, Esmeralda County; to Lander County; south to the Spring, River, Newberry and Muddy Mountains, Clark County.

Soils

Desert pepperweed grows on sandy, gravelly and alkaline soils.

LYAN *Lycium andersonii* Anderson's wolfberry

Fire Effects

Fire typically destroys aboveground parts of Anderson wolfberry, but the degree of damage to the plant depends on fire severity.

Grazing Effects

Anderson wolfberry is sometimes used as forage by livestock. Palatability of Anderson wolfberry browse is presumably fair to low. This species is used as forage only when more desirable species are unavailable. The fruit, however, appears to be moderately palatable. Palatability of Anderson wolfberry browse is presumably fair to low. Anderson wolfberry is sometimes used as forage by feral burros. The red berries are eaten by some birds and mammals. In some areas of southern Nevada, the fleshy leaves and juicy berries provide part of the succulence permitting Gambel quail to occupy desert areas devoid of drinking water. In desert washes Anderson wolfberry grows in dense thorny thickets which provide good cover for quail and other small wildlife.

Site Characteristics

Anderson wolfberry commonly grows on sandy or gravelly washes, sandy or alkali flats, mesas and slopes generally from 2,000 to 6,000 feet in elevation. Anderson wolfberry typically occurs on hot, dry sites and often occurs in areas with only 5 to 6.5 inches annual precipitation. Anderson's wolfberry is common and widely distributed in the south extending north as far as areas west of Wendover, Elko County; to Churchill, Esmeralda, Nye, Lincoln and Clark Counties.

Soils

Anderson's wolfberry exhibits some degree of facultative adaptation for salt tolerance and has been known to occur on poorly drained soils with high alkalinity and/or salinity. Anderson wolfberry also occurs on highly calcareous, well-developed desert pavement with a strongly cemented caliche layer.

LYCO2 *Lycium cooperi* Cooper's wolfberry

Fire Effects

Similar to LYPA

Grazing Effects

Similar to LYPA

Site Characteristics

Cooper's wolfberry is common on dry, gravelly washes, desert mesas, arroyos and slopes with encelia, acacia and burrobrush at elevations between 2,000 and 3,300 feet. Cooper's wolfberry is infrequent, known

from Tule Canyon Springs, Esmeralda County; south to the west edge of Spirit Mount, Newberry Mountains and also from the Virgin Mountains, to the Muddy and McCullough Mountains, Clark County.

Soils

Cooper's wolfberry grows on gravelly, well-drained soils.

LYPA *Lycium pallidum* pale wolfberry

Fire Effects

Severe fires may kill pale wolfberry, but low- to moderate-severity fires probably only consume its aerial portions. Pale wolfberry sprouts from the root crown following damage, thus, it probably sprouts after fire.

Grazing Effects

Pale wolfberry fruits and its foliage may be browsed by livestock. It is hardly used by big game. Pale wolfberry fruits are consumed by birds and some rodents.

Site Characteristics

Pale wolfberry is found on plains and flats, along washes and arroyos, on dry rocky hills, mesas, and bajadas, and on rocky slopes and canyons of hills and mountains at elevations between 2,000 and 4,200 feet and precipitation ranging from 5 to 8 inches. Common in Nye County; from Stewart Valley, to Beatty and Ash Meadows, to Pahrump Valley, Amargosa Valley, Bullfrog Mountains, extending to the Virgin Mountains, Clark County and eastern Lincoln County.

Soils

Pale wolfberry is tolerant of saline soils and has a high calcium carbonate tolerance. Pale wolfberry is found on medium and coarse textured soils with a pH between 7.0 and 8.5.

MESP2 *Menodora spinescens* spiny menodora

Fire Effects

Spiny menodora often survives fire because its foliage does not readily burn.

Grazing Effects

Cattle will graze the stems of spiny menodora in the spring before the stems become woody and spiny. *Spiny menodora has lower palatability than the other shrubs but is consumed during early spring before spines mature.* Elk will graze the stems of

spiny menodora in the spring before the stems become woody and spiny.

Site Characteristics

Spiny menodora can be found at elevations between 2,600 and 6,900 feet and precipitation ranging from 5 to 10 inches. Spiny menodora is common and widespread throughout the south from Nye, Mineral, Esmeralda, and Clark Counties.

Soils

Spiny menodora occurs on sandy and gravelly soils.

MOUT *Mortonia utahensis* Utah mortonia

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

Utah mortonia is found in limestone crevices, dry, talus slopes and canyons with saltbush and creosotebush at elevations between 1,800 and 3,800 feet. Utah mortonia is locally common in southern Nevada, from the central Specter Range, Nye County; to the Muddy Valley, Lincoln County; south to the south end of the Virgin Mountains, to the Valley of Fire State Park, Clark County.

Soils

Utah mortonia is found in soils that are shallow to very shallow and well drained. Formed in residuum and colluvium derived from limestone and dolomite. The soils have a high amount of stones, cobbles and gravels on the surface and in profile. The soils are strongly to moderately alkaline. Soil series associated include St. Thomas.

OPAC *Opuntia acanthocarpa* buckhorn cholla

Fire Effects

Buckhorn cholla adapted to survive fire by sprouting from the root crown.

Grazing Effects

The pads of *Opuntia* species can be used as emergency forage for livestock after the spines have been singed off. Pronghorn, deer and mountain sheep feed on the vegetable parts and fruits of buckhorn cholla. Buckhorn cholla is grazing tolerant.

Site Characteristics

Buckhorn cholla is found on benches,

mountain slopes and washes at elevations between 2,000 and 4,500 feet. Buckhorn cholla is known only in southern Nevada, from Wilson Ranch area, Spring Mountains, to 40 miles northeast of Las Vegas and west of Davis Dam, to Newberry Mountains and Virgin Mountains, Clark County.

Soils

Buckhorn cholla grows on well drained sandy, loamy, rocky and gravelly soils derived from limestone origin.

OPBA2 *Opuntia basilaris* beavertail pricklypear

Fire Effects

Prickly-pear plants are vulnerable to fire. Plants regenerate by sprouting from the root crown.

Grazing Effects

Prickly-pear is regarded as an important emergency forage for livestock. Although the moisture content of aboveground tissues of plains prickly-pear is high, nutrient content is low. The palatability of prickly-pear to livestock is generally considered poor to fair, because spines deter grazing. Beavertail pricklypear is browsing tolerant and is used as a food source for small and large mammals, upland game birds, and waterfowl. The palatability of plains prickly-pear to wildlife is generally considered poor to fair, because spines deter grazing.

Site Characteristics

Beavertail pricklypear is common in washes and along plains, valleys and canyons with creosotebush, yucca and sagebrush at elevations between 700 and 6,000 feet. Beavertail pricklypear is known in southern Nevada only, from east slope of the Silver Peak Range, near Crater, Esmeralda County; to north Ash Meadows, to below the west Spotted Range and Ranger Mountains, to Grapevine Mountain, Nye County; to southwest of Elgin to the eastside of upper Pahrangat Lake, Lincoln County; south to the Spring Mountains, through the Muddy, McCullough and Virgin Mountains, Clark County.

Soils

Beavertail pricklypear grows on well drained sandy, loamy, rocky and gravelly soils derived from limestone origin.

PEPA13 *Petalonyx parryi* Parry's

sandpaper plant

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

Parry's sandpaperplant is found on dry, desert washes and canyons at elevations between 1,200 and 3,800 feet. Parry's sandpaperplant is common and widespread in the extreme south, from Glendale Junction to the Valley of Fire State Park, to the Muddy Mountains, Clark County.

Soils

Parry's sandpaperplant is often found on gypsum and micaceous shales.

PESC4 *Peucephyllum schottii*
pygmycedar

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

Pygmycedar is found on limestone ridges, rock cervices, cliffs, washes and canyon slopes at elevations between 700 and 4,200 feet. Pygmycedar is known in southern Nevada only, from the mountains toward the north end of Pahrump Valley and from the eastside of Stewart Valley, Nye County; south to the Spring Mountains, to the Spotted Range, Newberry Mountains, through the Muddy, McCullough, Virgin and River Mountains, Clark County.

Soils

Pygmycedar grows on rocky, gravelly soils.

PIDE4/ (ARSP5) *Picrothamnus desertorum* / (*Artemisia spinescens*) bud sagebrush

Fire Effects

Bud sagebrush is killed by fire. It will recolonize by off-site seed.

Grazing Effects

Bud sagebrush is palatable and nutritious forage for domestic sheep in the winter and spring although it is known to cause mouth sores in lambs. Bud sagebrush can be poisonous or fatal to calves when eaten in quantity. Bud sagebrush, while desired by cattle in spring, is poisonous to cattle when consumed alone. Bud sagebrush is palatable, nutritious forage for upland game birds,

small game and big game in winter. Bud sagebrush provides forage for mule deer in Nevada in winter and is utilized by bighorn sheep in summer, but the importance of bud sagebrush in the diet of bighorns is not known. Bud sagebrush comprises 18 – 35% of a pronghorn's diet during the spring where it is available. Chukar will utilize the leaves and seeds of bud sagebrush. Bud sagebrush is highly susceptible to effects of browsing. It decreases under browsing due to year-long palatability of its buds and is particularly susceptible to browsing in the spring when it is physiologically most active.

Site Characteristics

Bud sagebrush generally grows in arid areas including foothills and ridges at elevations between 3,400 to 6,600 feet and has excellent drought. Annual precipitation ranges from 6 to 14 inches. Bud sagebrush is common and widespread throughout the state.

Soils

Bud sagebrush grows on soils shallow to very deep, loamy, well-drained, and slightly alkaline.

PLSE *Pluchea sericea* arrowweed

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

Arrowweed is found in disturbed areas, roadsides, fence rows and moist canyons at elevations between 600 and 3,000 feet. Arrowweed is known in southern Nevada only, from Ash Meadows, Nye County; to the Muddy Valley, Lincoln County; south to Cottonwood Springs, Spring Mountains, to the Newberry, Muddy and Virgin Mountains, Clark County.

Soils

Arrowweed grows on sandy and gravelly soils.

PRAN2 *Prunus andersonii* desert peach

Fire Effects

Desert peach sprouts from rhizomes and/or lignotubers following fire, and becomes abundant on burned sites. Post fire seedling establishment is rare based on the limited post fire regeneration studies available.

Desert peach is typically only top-killed by fire. Neither aboveground stem survival nor complete shrub kill is reported following fire; however, literature on these topics is limited.

Grazing Effects

Livestock consume the foliage in the spring and following rainy periods. Mule deer consume new desert peach growth in the early spring and frequent desert peach habitat. Numerous small mammals gather and consume desert peach fruits and seeds and/or browse desert peach stems. White-tailed antelope squirrels, Great Basin pocket mice, deer mice, and Panamint kangaroo rats utilize desert peach fruits and seeds. Black-tailed jackrabbits seasonally utilize desert peach as forage.

Site Characteristics

Desert peach can withstand harsh, arid sites in the Great Basin and Mojave Desert. It is often found in the transitions from desert to oak woodland. It is not capable of withstanding the very arid and saline environment of the true desert. Typical sites include dry, warm foothills, dry streambeds, mountain slopes, mesas, alluvial terraces, and canyons. Most plants can be found at elevations ranging from 2,400 to 7,000 feet and precipitation ranging from 7 to 12 inches. Desert peach is widely distributed in southern Nevada; from Palmetto Range, Esmeralda County; to Armargosa Valley, Mercury Valley, Rock Valley to the northwest Spring Mountains and Reveille Range, Nye County; to the Mormon Mountains and Caliente area of Lincoln County; Newberry Mountains, Spring Mountains, River Mountains, extends through the Muddy, Virgin and McCullough Mountains, Clark County.

Soils

Desert peach is common on well-drained, poorly-developed, granitic soils. Slightly saline or alkaline, coarse-textured soils are tolerated. On Granite Mountain north of Reno, desert peach occurs in dense clumps on Mollic Haplargids with sandy to clay loam textures. In central Nevada's Mill Creek watershed, desert peach occupies coarse to fine loamy Mollisols in big sagebrush/rubber rabbitbrush/cheatgrass vegetation and loamy, skeletal Haploxerolls in black cottonwood/big sagebrush

communities.

PRFA *Prunus fasciculata* desert almond **Fire Effects**

Desert almond sprouts from rhizomes and/or lignotubers following fire, and becomes abundant on burned sites. Post fire seedling establishment is rare based on the limited post fire regeneration studies available. Desert almond is typically only top-killed by fire. Neither aboveground stem survival nor complete shrub kill is reported following fire; however, literature on these topics is limited.

Grazing Effects

Desert almond is a seasonally important forage species on the dry ranges where it grows. Livestock consume the foliage in the spring and following rainy periods. Mule deer and various small mammals feed on desert almond and/or utilize habitats where desert almond is dominant.

Site Characteristics

Desert almond can withstand harsh, arid sites in the Great Basin and Mojave Desert. It is often found in the transitions from desert to oak woodland. It is not capable of withstanding the very arid and saline environment of the true desert. Typical sites include dry, warm foothills, dry streambeds, mountain slopes, mesas, alluvial terraces, and canyons. Most plants can be found at elevations ranging from 2,400 to 7,000 feet and precipitation ranging from 7 to 12 inches. Desert almond is widely distributed in southern Nevada; from Palmetto Range, Esmeralda County; to Armargosa Valley, Mercury Valley, Rock Valley to the northwest Spring Mountains and Reveille Range, Nye County; to the Mormon Mountains and Caliente area of Lincoln County; Newberry Mountains, Spring Mountains, River Mountains, extends through the Muddy, Virgin and McCullough Mountains, Clark County.

Soils

Desert almond is found on well-drained soils, most likely on soils that are coarse sandy, gravelly, or rocky in texture and exhibit little profile development.

PRGL2 *Prosopis glandulosa* honey mesquite

Fire Effects

Following top-kill by fire, numerous sprouts arise from the underground buds. Mortality is low in honey mesquite, particularly in lowland areas where root systems are well developed.

Grazing Effects

Numerous domestic animals consume and disperse honey mesquite seed. The fruit of honey mesquite is valuable forage for livestock. Cattle, horses, domestic sheep and goats, mules, and burros eat large quantities of the ripe fruit during summer and fall. Livestock do not consume the foliage to any great extent. Foliage consumption is high only during drought years, especially in the early spring when other forage is sparse. Honey mesquite increases on ranges where heavy overgrazing has removed more palatable species. Mesquite browse is generally not a very important wildlife food source. Wild turkeys, round-tailed ground squirrels, cottontails, and woodrats consume some leaves. Jackrabbits consume large amounts of honey mesquite. The sweet, nutritious seed pods of honey mesquite are highly palatable to all types of small and large wildlife species.

Site Characteristics

In arid areas where annual rainfall is less than 6 inches, honey mesquite is typically found along drainageways, alkali sinks, outwash plains, dry lakes, oases, arroyo, or riverbanks, where plants have access to permanent underground water. Honey mesquite is found at elevations between 2,100 and 4,800 feet. Honey mesquite is known in southern Nevada only, from Stewart Valley and common at Ash Meadows and Amargosa Valley, to the south slope on the northwest Spring Mountains, Nye County; to southern Lincoln County; and various locations in the Newberry Mountains, Clark County.

Soils

Honey mesquite is adapted to most soil types including loamy sands, sandy loams, calcareous silt loams, noncalcareous silt loams, gravelly sand loams, deep sandy loams and calcareous clays.

PRPU *Prosopis pubescens* screwbean mesquite

Fire Effects

Screwbean mesquite can survive fire, but

little is known of the adaptations that allow for this. Weak resprouting after fire has been reported, but whether this was from surviving apical buds or adventitious buds on the root crown, as in other southwestern mesquites is not discussed.

Grazing Effects

Screwbean mesquite is eaten by livestock. Cattle are known to eat screwbean mesquite pods. However it is possible that the spines of screwbean mesquite deter some browsers. Although screwbean mesquite is an important part of the diet for many species, it is not recommended as animal feed. Screwbean mesquite is important as cover and food to wildlife. Species noted to eat mesquite pods or leaves were white-winged doves, ravens, hooded skunks, and deer.

Site Characteristics

Screwbean mesquite is found along streams, washes, floodplains, gullies, and in alkali sinks, oases, arroyos, and bajadas in the desert southwest. It reaches dominance on floodplains in a zone near the edge of the 1st terrace and on higher alluvial terraces of large perennial waterways, approximately 5 to 20 feet (1.5-6 m) above the river channel. Screwbean mesquite is found at elevations between 1,600 and 3,100 feet. Screwbean mesquite is common in southern Nevada, scattered in groves, from north and east Ash Meadows, also at Oasis Valley, Nye County, where it was perhaps planted; south to the Newberry Mountains, to the Spring and Virgin Mountains.

Soils

Screwbean mesquite occurs on a wide range of soil textures, such as light and sandy to heavy, clay soil textures. Screwbean mesquite can often be found in slightly to moderately saline soils. Screwbean mesquite was found to be more salt tolerant than Fremont cottonwood and Goodding willow at shallow and deep soil levels. Screwbean mesquite occurs on alkaline sites.

PSCO2 *Psilostrophe cooperi* whitestem paperflower

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

Whitestem paperflower is found at

elevations between 1,600 and 5,000 feet. Whitestem paperflower is known in southern Nevada only, from Mercury Valley, Nye County; to Moapa, Lincoln County; south to the Spring, Newberry, Muddy, McCullough and Virgin Mountains.

Soils

Whitestem paperflower can be found in a variety of soils on sandy uplands and washes of upper south-facing bajadas.

PSFR *Psorothamnus fremontii* Fremont's dalea

Fire Effects

Resprouting has been documented.

Grazing Effects

No information available.

Site Characteristics

Fremont's dalea occurs on dry plains, slopes and hillsides, below limestone mountain ranges in the south at elevations between 1,600 and 4,400 feet. Fremont's dalea is common and widely distributed in the south from north, Ash Meadows, to northeast Crater Flat, to Amargosa, Mercury and Rock Valley and Jackass Flat, Nye County; to Esmeralda County; to the Muddy and Pahrangat Valleys, Lincoln County; south to the Newberry Mountains, to the Valley of Fire State Park and the Spring and Virgin Mountains, Clark County.

Soils

Fremont's dalea grows in sandy areas.

PSPO *Psorothamnus polydenius* Nevada dalea

Fire Effects

Communities in which Nevada dalea occur rarely burned, thus Nevada dalea has little adaptation to fire and is probably killed.

Grazing Effects

Nevada dalea is of little importance to livestock due to its low palatability. Nevada dalea has low palatability to many wildlife species.

Site Characteristics

Nevada dalea occurs in sandy desert plains, foothills, alkaline flats and low talus hillsides with creosote, sagebrush, wolfberry and saltbush at elevations between 2,200 and 5,000 feet and precipitation ranging from 3 to 10 inches. Nevada dalea is common and widespread along the entire western half of the state.

Soils

Nevada dalea is commonly found on very deep sandy soils.

PSSP3 *Psorothamnus spinosus* smoketree

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

Smoketree occurs on sandy and rocky desert washes with creosotebush at elevations between 800 and 1,000 feet. Smoketree is rare, known in the Newberry Mountains in southern Clark County.

Soils

Smoketree can be found in soils that are deep alluvium derived from granite, schist and/or gneiss. The soils are modified by high amounts of gravels, cobbles, or stones throughout the profile.

PUST *Purshia stansburiana* Stansbury cliffrose

Fire Effects

Fire effects on Stansbury cliffrose are variable. Fire may kill or severely damage plants. Late-season fire also increases the risk of mortality. Stansbury cliffrose is a weak sprouter that is generally killed by severe fire.

Grazing Effects

Stansbury cliffrose is an important browse species for livestock, especially in the winter. Stansbury cliffrose is moderately browse tolerant. With high percentages of utilization, Stansbury cliffrose has been found to decline. With moderate utilization it showed good growth and seed production. Stansbury cliffrose is an important browse species for mule deer, pronghorn, game birds, and songbirds. Wild ungulates use it heavily in winter.

Site Characteristics

Stansbury cliffrose occurs on cliffs and other exposed, dry sites such as mesas and foothills at elevations between 3,000 to 7,800 feet. Aspect is usually south or west. Stansbury cliffrose can survive on sites receiving less than 12 inches of annual precipitation. Stansbury cliffrose is widely distributed throughout eastern, central and southern Nevada; from Pequop Summit, Elko County; to Silver Peak Range of

Esmeralda County; south to Spring Mountains, through Virgin, Muddy and McCullough Mountains, Clark County.

Soils

Soils are acidic to alkaline, well-drained, and have a coarse sandy, gravelly, or rocky texture.

QUGA *Quercus gambelii* Gambel's oak

Fire Effects

Gambel's oak is a fire-adapted species. It responds to fire by vegetative sprouting from the lignotuber and rhizomes. Tree forms may survive low-severity fire. Fire may top-kill Gambel's oak. Gambel's oak habit and community structure affect susceptibility to fire. Tree forms are less likely to be top-killed in a low-severity fire compared to shrubs with branches closer to the burning surface fuels.

Grazing Effects

Because of its size, leafiness and great abundance, Gambel's oak produces a vast amount of herbage, which is usually fair in palatability for all classes of livestock. Gambel oak may contribute up to 50% of diet without cattle showing any ill effects. Poisoning occurs when more than 50% is consumed, with death often resulting when more than 75% of cattle's diet is Gambel oak. Freezing enhances toxic properties of Gambel oak browse; young foliage turned black by freezing is extremely toxic. On some grass ranges where there is a scarcity of palatable browse, it is considered fairly good forage. On overgrazed ranges, this oak is usually grazed so closely as to form a grazing line, below which all of the foliage is stripped annually. Gambel oak is an ecologically important species providing food and shelter for many wildlife species. Gambel oak is a major forage species for deer and elk. Gambel oak is moderately used, relative to other forage and browse species, by mule deer in winter and spring with heavier use occurring in summer and fall. In its southern range, Gambel oak is a desirable species for desert mule deer.

Site Characteristics

Gambel's oak does not occur in areas where winter precipitation falls below 10 inches or where subfreezing temperatures persist for long periods of time. Gambel's oak can be found at elevations between 4,400 and 7,500

feet. Gambel's oak is known only from southern Nevada from the Central Belted Range, Central Rainier Mesa and Shoshone Mountains, Nye County; to Caliente and Beaver Dam State Park, Lincoln County; south to Spring and Virgin Mountains, Clark County.

Soils

Although often found on coarse or even rocky sites, it prefers the sandy or gravelly loams, and attains its best development in canyon bottoms and sheltered places in rich loam soils, where its extensive roots receive adequate moisture.

QUTU2 *Quercus turbinella* turbinella oak

Fire Effects

Turbinella oak is well adapted to survive fire and typically resprouts vigorously from the root crown and rhizomes in response to fire or other disturbance.

Grazing Effects

Cattle, domestic sheep, and domestic goats use turbinella oak at least moderately. Palatability of turbinella oak to most species of livestock is relatively low in most seasons. New sprouts are most palatable and are browsed readily. Turbinella oak is of greatest forage value during drought emergencies. When grass forage is available turbinella oak is utilized lightly. Overgrazing of more palatable forage associated with turbinella oak, will allow the oak to become dominant. The foliage of turbinella oak is utilized to at least some degree by a number of big game species. Turbinella oak generally provides relatively little browse for most species of wildlife. In many areas it is used heavily only when other more palatable species are lacking; however, turbinella oak is sometimes an important food source for mule deer.

Site Characteristics

Turbinella oak is drought-resistant and inhabits dry hillsides and mesas at elevations between 3,000 and 7,500 feet and precipitation ranging from 10 to 18 inches. Turbinella oak is common in the semi-desert shrub communities and extends up into the juniper-pinyon woodlands. Turbinella oak is known found in southern Nevada; south to Caliente, Lincoln County; to Newberry Mountains, south to La Madre Mountains, Virgin Mountains to the Spring Mountains,

Clark County.

Soils

Turbinella oak tolerates a wide range of soil types. Growth is best on sandy to clay loams that are often slightly acidic. It can grow shallow to very deep soils.

RICE *Ribes cereum* wax currant

Fire Effects

Wax currant regeneration is favored by short-duration, low-severity fire because soil-stored seed requires scarification to germinate. Most wax currant plants are severely damaged or killed by fire. The ability of wax currant to sprout after fire is weak.

Grazing Effects

Wax currant is considered fair to poor browse for livestock, although it is important on ranges where little else is available. Wax currant provides food and cover for wildlife. It is only fair to poor browse for deer, but it is important on ranges where little else is available.

Site Characteristics

Wax currant commonly occurs on dry, open slopes, ridges, and rock outcrops at elevations from 6,000 to 9,200 feet with an average annual precipitation of 13.6 inches. Wax currant is common and widespread throughout the state.

Soils

Wax currant grows on medium and coarse textured soils with a pH between 6.5 and 7.5. Wax currant has a high calcium carbonate tolerance.

RIMO2 *Ribes montigenum* gooseberry currant

Fire Effects

Fire kills gooseberry, however, regeneration is favored by fire because scarification of soil-stored seed generally enhances germination in gooseberry.

Grazing Effects

Gooseberry currant is not very palatable to livestock. The fruit of Gooseberry currant is a valuable food source for songbirds, chipmunks, ground squirrels, and other animals.

Site Characteristics

Gooseberry current occurs on upper back slopes of mountains and along mountain ridgelines. At higher elevations, it occurs on

southerly aspects. At lower elevations, it will occur on all aspects.

Soils

The soils associated with gooseberry current tend to be shallow to moderately deep, well drained soils derived in residuum and colluvium from limestone and dolomite. There tend to be high amounts of gravel and/or stones on the soil surface and throughout the soil profile.

ROWO *Rosa woodsii* Wood's rose

Fire Effects

Wood's rose is typically top-killed by fire. Wood's rose is moderately fire tolerant and is usually favored by low-severity fire. It can persist after low to moderate severity fire because of its ability to sprout from undamaged or buried root crowns and rhizomes. The shallow root crowns of Wood's rose are susceptible to injury, and populations consequently decrease following high-severity fire. It occasionally germinates from on-site and off-site seed sources after fire.

Grazing Effects

The leaves of Wood's rose are considered fair to fairly good livestock forage, particularly for domestic sheep. Wood's rose is strongly grazing tolerant, but can be dwarfed and thinned by intense browsing. Mule deer browse Wood's rose throughout the growing season. Wood's rose has good food value for upland game birds, nongame birds, and small mammals, but poor food value for waterfowl.

Site Characteristics

It occurs on dry slopes, streambanks, open woods, hillsides, washes, waterways, irrigation canals, marshlands, lakeshores, hillsides, open woodlands, roadsides, and canyons at elevations between 2,200 and 9,000 feet. Wood's rose prefers moderate climates; however, it will grow in alpine environments. In the Great Basin, Wood's rose grows where climatic conditions are characterized by cold winters with moderate snowfall and late spring rainfall. Summers are typically hot and dry, coupled with a high evaporation rate. Wood's rose is found in areas where there is 6 to over 20 inches of annual rainfall. Wood's rose is common and widespread throughout the state and occurs in every county.

Soils

Wood's rose is adapted to a wide range of soil types. It generally grows best on moderately fertile, well-drained clay loam, sandy loam, or sandy soil. Soil orders in which Wood's rose is normally found included Inceptisols, Entisols, and/or Mollisols. Wood's rose prefer soils with a pH of 5.6 to 7.0.

SADOC4 *Salvia dorrii* purple sage

Fire Effects

Purple sage has high a tolerance to fire and will resprout following fire.

Grazing Effects

Purple sage has low to medium palatability for livestock. Purple sage has low to medium palatability for wildlife.

Site Characteristics

Purple sage grows on dry slopes and rocky bluffs in sagebrush associations at elevations between 2,800 and 9,000 feet and precipitation ranging from 8 to 14 inches. Purple sage is common and widespread throughout the state and is known in every county except Churchill County.

Soils

Purple sage occurs in sandy and gravelly soils, with pH ranging from 6.5 to 8.0.

SAEX *Salix exigua* coyote willow

Fire Effects

Coyote willow is top-killed by fire but readily resprouts from roots, root crowns, and basal stems after fire. It is among the first species to appear following fire. Coyote willow-dominated communities, like other riparian vegetation, may act as natural firebreaks due to the high water table and proximity to surface water present in these areas.

Grazing Effects

Coyote willow provides important browse for livestock. Coyote willow is palatable to domestic livestock, though palatability varies with location and season. Coyote willow palatability is "fair" for domestic sheep, cattle, and horses. Domestic cattle find it more palatable in late summer than earlier in the season. The fallen and brown leaves are eaten by domestic sheep. Livestock browsing substantially reduced the height and density of coyote willow stems in riparian areas. Coyote willow is

browsed by elk and to a limited extent, mule deer. Where abundant, it may be important late summer and winter browse for elk.

Coyote willow is important and heavily-used browse for beaver. Wildlife browsing may substantially reduce development and increase mortality. In addition, trampling reduces the establishment of coyote willow in riparian areas. It is a prolific sprouter and will re-establish following release from heavy grazing pressure, provided it has not been totally removed from the site.

Site Characteristics

Coyote willow grows on moist or wet sites from the plains, desert shrub, and sagebrush zones to lower mountain habitats. Coyote willow generally grows in open to densely-vegetated riparian communities along streams, gravel bars, lakeshores, and ditches. At high elevations, it is confined to streamside communities though at low to mid-elevations, coyote willow may be found on moist, well-drained benches, floodplains, and bottomlands. Common sites include fluvial canyons, braided stream channels, and low elevation alluvial valleys. Coyote willow is often more abundant where river bank angles are moderately steep or where canyons narrow. Coyote willow grows at elevations between 1,400 and 8,000 feet and precipitation ranging from 3 to over 20 inches. Coyote willow is very common and widespread, known in every county.

Soils

Soils are generally rocky, gravelly, or sandy. Less frequently, coyote willow is also found on clay soils. Though neutral pH (7.2 to 7.6) is optimal, coyote willow also grows outside that narrow range. It is more often found on alkaline soils, though it may also be found on slightly acid soils.

SAME *Salazaria mexicana* bladdersage

Fire Effects

Information is not available regarding the immediate effects of fire on bladdersage. However, bladdersage is probably top-killed or killed by fire. Severe fires may kill belowground rhizomes.

Grazing Effects

Bladdersage is grazed only lightly by cattle and horses except on ranges where little other forage is available. Bladdersage is browsed by several different species of

wildlife.

Site Characteristics

Bladdersage occurs in dry washes and canyons, on desert hillsides and mesas, and along arroyos at elevations between 1,200 and 5,500 feet. Bladdersage is common and widely distributed in the south, from Crater Flat, north Amargosa Valley, Rhyolite and Bullfrog Hills, Nye County; through southern Esmeralda County; to the Muddy Valley and the Pinewater Range, Lincoln County; south to the Spring, River, Newberry Mountains and extending to the Muddy, Virgin and McCullough Mountains, Clark County.

Soils

Bladdersage is commonly found on sandy, gravelly, or clayey soils.

SAMO3 *Salvia mohavensis* Mojave sage

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

Mojave sage occurs on dry, rocky, desert slopes, canyon walls and wash of limestone mountains in low deserts at elevations between 2,100 and 3,200 feet. Mojave sage is known in southern Nevada only, from mountains on the side of Stewart Valley, southern Nye County; to the Newberry and River Mountains and along hillsides near Boulder City, Clark County.

Soils

Mojave sage is found in a variety of soils among washes and limestone hills.

SAVE4 *Sarcobatus vermiculatus* black greasewood

Fire Effects

Black greasewood communities are historically subject to stand-replacing fire regimes with intervals of <100 years. Black greasewood may be killed by severe fires, but it commonly sprouts soon after low to moderate-severity fire.

Grazing Effects

Black greasewood is an important winter browse plant for domestic sheep and cattle. Black greasewood provides important cover habitat for livestock, especially during the winter. Livestock utilize greasewood for winter cover and early spring browse. Black

greasewood may increase in response to grazing. Removal of competition can dramatically increase growth rates and total leader length of black greasewood. Black greasewood is an important winter browse plant for big game animals. It also receives light to moderate use by mule deer, and pronghorn during spring and summer months. Black greasewood also provides important cover habitat for wildlife, especially during the winter.

Site Characteristics

Found at elevations between 2,200 to 8,000 feet. Black greasewood grows in areas receiving 3 to 20 inches of annual precipitation. Precipitation is unevenly distributed, with most falling during 2 periods: March through May and July through August. Black greasewood is common and widespread throughout the state and is known in every county.

Soils

Black greasewood tolerates mildly to strongly sodic soil as well as non-saline to strongly saline soils. It is normally found on soils that are primarily fine-textured, but this plant will grow on a wide variety of soils from very heavy clays to cobbly loams.

SAVEB *Sarcobatus vermiculatus* var. *baileyi* Bailey's greasewood

Fire Effects

Greasewood may be killed by severe fires, but it commonly sprouts soon after low to moderate-severity fire.

Grazing Effects

Bailey's greasewood is an important winter browse plant for domestic sheep and cattle. It also receives light to moderate use by domestic sheep and cattle during spring and summer months. Greasewood contains soluble sodium and potassium oxalates that may cause poisoning and death in domestic sheep and cattle if large amounts are consumed in a short time. Bailey's greasewood is an important winter browse plant for big game animals and a food source for many other wildlife species. It also receives light to moderate use by mule deer and pronghorn during spring and summer months.

Site Characteristics

Bailey's greasewood occurs in arid climates that receive 4 to 8 inches of precipitation

annually. It occurs on dry slopes, flat areas, ridges, and valley bottoms at elevations between 2,200 to 6,000 feet. Bailey's greasewood is a common associate of shadscale.

Soils

Bailey's greasewood will grow on coarse to fine textured soils that are moderately to strongly alkaline and also calcareous.

SEAR8 *Senna armata* desertsenna

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

Desertsenna occurs on dry, desert, sandy slopes, washes and roadsides with blackbrush, Acacia, dalea, yucca and creosotebush at elevations between 2,400 and 3,800 feet. Desertsenna is locally common in the Newberry Mountains, at Hiko Springs and Searchlight areas, to the Muddy Mountains, Clark County.

Soils

Desertsenna grows in gravelly or sandy soils.

SUMO *Suaeda moquinii* alkali seepweed

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

Alkali seepweed occurs on dry salt marshes with saltbush, greasewood and creosotebush at elevations between 2,200 and 7,000 feet. Alkali seepweed is common and widespread, known in every county.

Soils

Deep, alkaline soils of basin floors.

SYLO *Symphoricarpos longiflorus* desert snowberry

Fire Effects

Desert snowberry has a root crown and rhizomes that sprout after fire. Although no specific information about the immediate effect of fire on desert snowberry is available, it is most likely top-killed by fire.

Grazing Effects

Since desert snowberry leafs out in early spring it is utilized by all browsing livestock at that time but, in general, use is very

limited. Desert snowberry is browsed by deer and the seeds are eaten by birds, especially the gallinaceous birds such as ring-necked pheasants, grouse, and quail. Sage-grouse in Nevada utilize desert snowberry as both juveniles and adults. The American pika and various ground squirrels also eat the seeds. Desert snowberry is used lightly in all seasons but winter, when it is not utilized by mule deer. Limited summer use of desert snowberry by pronghorns in has been observed. Cover value of desert snowberry for big game is limited by its size. However, it provides fair cover for both upland game birds and small nongame birds and good cover for small mammals.

Site Characteristics

Desert snowberry is common in desert areas at elevations between 3,800 and 7,500 feet. The minimum annual precipitation for desert snowberry is between 6 and 12 inches. Desert snowberry is common and widespread throughout the state, except for the northeastern and central counties.

Soils

Desert snowberry is common on dry, rocky soils in desert areas and on granitic substrates.

SYOR2 *Symphoricarpos oreophilus* mountain snowberry

Fire Effects

Fires top-kill mountain snowberry. Although plant survival may be variable, mountain snowberry root crowns usually survive even severe fires. Mountain snowberry sprouts from basal buds at the root crown following fire.

Grazing Effects

Snowberry is readily eaten by all classes of livestock, particularly domestic sheep. Mountain snowberry's tendency to sprout enables plants to persist and even increase following browsing. However, plant densities decrease substantially in response to prolonged browsing. Snowberry is an important forage species for deer and elk on high elevation summer ranges. Snowberry is frequently one of the first species to leaf out, making it a highly sought after food in the early spring.

Site Characteristics

Mountain snowberry is found on all aspects on sites ranging from moist to fairly dry. It

is found at elevations between 3,000 and 9,000 feet and precipitation ranging from 12 to over 20 inches. Mountain snowberry is common and widespread throughout the state.

Soils

Mountain snowberry usually occurs on sandy loam to clay loam soils and in both acidic and basic soils.

TICA3 *Tiquilia canescens* shrubby tiquilia

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

Shrubby tiquilia occurs on rocky ridges, benches, ledges and grassy slopes or limestone outcrops with saltbush, Encelia, bursage and creosotebush at elevations between 600 and 3,700 feet. Shrubby tiquilia is known only in southern Nevada, from the southern mountain ranges, Nye County; to the McCullough Range and the Virgin, Spring, Newberry and Black Mountains, Clark County.

Soils

Shrubby tiquilia grows on gypsiferous or calcareous, gravelly loam and desert sands.

TIPA *Tiquilia palmeri* Palmer's tiquilia

Fire Effects

No information available.

Grazing Effects

No information available.

Site Characteristics

Palmer's tiquilia is found with creosotebush, dalea, bursage and Encelia at elevations between 600 and 1,000 feet. Palmer's tiquilia is occasional to common in most of the southern part of the state, from Davis Dam area to south of Empire Wash, Newberry Mountains, Clark County.

Soils

Palmer's tiquilia grows on desert sandy soil with clay or gravel.

VIPA14 *Viguiera parishii* triangle goldeneye

Fire Effects

No information available.

Grazing Effects

Triangle goldeneye has limited browse

value, when other forage is scarce, but otherwise are practically worthless as forage except that livestock will frequently pick off the flowering and fruiting heads, after frost, and nibble the leaves. Triangle goldeneye has limited browse value, when other forage is scarce, but otherwise are practically worthless as forage.

Site Characteristics

Triangle goldeneye occurs on fan piedmonts slopes, alluvial fans, and alluvial plains. Slopes can range between 0 and 30 percent with an elevation ranging between 800 to 2500 feet.

Soils

Soils tend to be moderately deep to deep and have formed in alluvium derived from granite, schist, or gneiss.

XYTO2 *Xylorhiza tortifolia* Mojave aster

Fire Effects

No information available.

Grazing Effects

Mojave aster has zero to low palatability and is a worthless forage plant. Mojave aster will increase on overgrazed ranges.

Site Characteristics

Mojave aster occurs on white, gravelly slopes, hills and washes with saltbush, creosotebush, hopsage, wolfberry, blackbrush and yucca at elevations between 1,500 and 4,800 feet. Mojave aster is common and widespread in the south, from Esmeralda County; to Ash Meadows, Bullfrog Hills, Mercury and Rock Valley and Jackass Flats, Nye County; south to the Spring and Newberry Mountains and extending into the McCullough, Virgin and Muddy Mountains, Clark County.

Soils

Mojave aster grows on sandy, gravelly soils.

YUBA *Yucca baccata* banana yucca

Fire Effects

Fire generally consumes the aboveground shrub layer of banana yucca. Mortality rates of banana yucca after fire likely depend on water stress and severity of damage sustained by the plant. Live plant material is often damaged by adjacent dead plant material that burns at higher temperatures. The ability of banana yucca to sprout from rhizomes and basal stem buds below the surface likely increases its chances of

survival in ecosystems prone to fire. This feature allows it to dominate some desert plant communities after fire.

Grazing Effects

Banana yucca provides browse to a variety of livestock. In the Mojave Desert rangelands, domestic sheep and cattle do not utilize banana yucca as forage although cattle have been observed eating the leaves in western Texas. Deer often use banana yucca as a food source searching out new leaves that sprout after fire and eating from the plant at a higher frequency than when it is not burned. Banana yucca is consumed by elk in the pinyon-juniper woodlands. Bighorn sheep browse on the leaves and fruit of banana yucca, and various parts of the plant are also utilized by small rodents, birds, and insects.

Site Characteristics

Banana yucca can be found on open dry plains, woodlands, slopes, and grasslands at elevations ranging from 3,500 to 7,000 feet. In Nevada, banana yucca is generally found on west- and south-facing aspects of dry slopes and washes where precipitation averages 6 inches. Banana yucca is known in southern Nevada only, from the Timpahute Range to the central Belted Range, Nye County; extending eastward to the Pahrangat Valley, and the Hiko Mountains, Lincoln County; to the Spring Mountains, Clark County.

Soils

Banana yucca is adapted to a wide range of coarse- to fine-textured soils with varying pH levels and is commonly found in areas where limestone is prevalent.

YUBR *Yucca brevifolia* Joshua tree

Fire Effects

Joshua tree sprouts from the root crown and/or rhizomes following fire. If the fire reaches the root crown the plant will die. Many Joshua trees are killed by fire.

Grazing Effects

Joshua tree use by livestock is limited to the consumption of accessible blossoms and fruits and utilization of shade. Palatability of Joshua tree is poor for cattle, domestic sheep, and horses. Joshua tree provides important habitat and food for small mammals, birds, reptiles, insects, and spiders. Use by deer, however, is limited to

the consumption of accessible blossoms and fruits and utilization of shade. Palatability of Joshua tree is poor for pronghorn, elk, mule deer, and small mammals.

Site Characteristics

Joshua tree occurs in hot, dry sites on flats, mesas, bajadas, and gentle slopes in the Mojave Desert, which is often described as a transition zone or ecotone, much like the Great Basin Desert in its northern parts and like the Sonoran Desert in its southern parts. Joshua tree survives in areas with cold winters, hot summers, and little precipitation. Most precipitation occurs from November through March. Annual precipitation ranges from 4 to 17 inches. Joshua tree can be found at elevations between 3,600 and 6,900 feet.

Soils

Soils in Joshua tree habitats are silts, loams, and/or sands described as fine, loose, well drained, and/or gravelly. Joshua tree tolerates alkaline and saline soils.

YUSC2 *Yucca schidigera* Spanish dagger / Mojave yucca

Fire Effects

Spanish dagger is top-killed by fire. Spanish dagger sprouts following fire. Post fire sprouting is described as vigorous. Vegetative regeneration predominates following fire; seedlings are rarely observed.

Grazing Effects

Spanish dagger is rarely utilized by livestock, evidence of cattle browsing is a sign of poor range condition. Spanish dagger is important to a variety of desert wildlife species. Small mammals, birds, and reptiles utilize Spanish dagger for food, nest materials, nesting sites, and habitat.

Site Characteristics

Spanish dagger occurs on dry rocky slopes, flats, or washes throughout its range. Spanish dagger is found at elevations between 3,100 and 5,000 feet. Spanish dagger is abundant in the south, from the Colorado River to Searchlight, eastward in the desert and low hills and northward throughout the Las Vegas area and then northwest of Las Vegas to the Spring Mountains also extending beyond Glendale, the most easterly population, Clark County; to Frenchman Flat and Mercury Valley to Skull Mountain, Nye County.

Soils

Spanish dagger grows on gravelly, calcareous soils.

TREES

ABCOC *Abies concolor* Rocky Mountain white fir

Fire Effects

Young Rocky Mountain white fir is highly susceptible to fire, and mature trees are only moderately fire tolerant. Rocky Mountain white fir is an aggressive, shade-tolerant species that will seed into the understory of low-elevation ponderosa or Jeffrey pine stands or into mixtures of Rocky Mountain ponderosa pine, Douglas-fir, quaking aspen, and southwestern white pine. On these sites, its numbers were previously controlled by frequent surface fires. With fewer fires in the last century, it is becoming a major stand component at elevations and on sites where historically it was minor. Following stand-replacing fires, white fir reestablishes via

wind-dispersed seed. Exposed mineral soil seedbeds created by fire favor initial seedling establishment in Rocky Mountain white fir, but seedling survival is better in partial shade. Therefore, seedlings establish soon after fire if a canopy remains, but may take several years to establish if the canopy has been removed.

Grazing Effects

Stands dominated by Rocky Mountain white fir seldom produce enough forage for domestic livestock grazing except on harvested or open forest sites, or where grasses and sedges dominate the understory. Because they contain resins, terpenes, and other substances that make the foliage irritating to the digestive tract, most conifers are not particularly palatable to grazing animals. Rocky Mountain white fir may be slightly palatable to goats. Rocky Mountain white fir provides abundant browse and cover for large and small wildlife species. Deer, elk, and bear often use Rocky Mountain white fir habitats as either summer or winter range. Mule deer generally eat small amounts of Rocky Mountain white fir during the spring, fall, and winter, and sometimes larger amounts during the summer. Mule deer are especially fond of succulent, new Rocky Mountain white fir growth in the spring. Spring browsing of Rocky Mountain white fir by deer can be particularly heavy when small Rocky Mountain white firs are the only green food available; all of the current or previous year's growth may be consumed. Rocky Mountain white fir needles are an important part of the diet of blue grouse. Rocky Mountain white fir seeds are eaten by several species of small mammals and birds including grouse, chipmunks, and mice.

Site Characteristics

Rocky Mountain white fir grows from canyon bottoms and ravines up to ridgetops on gentle, moderate, and steep slopes of all aspects, where precipitation ranges from 20 to 35 inches and elevations ranges from 6,000 to 8,500 feet. Rocky Mountain white fir is common throughout the Sierra Nevada in western Nevada and also found in all of the eastern counties from the Ruby Mountains in Elko County; south to the Spring Mountains in Clark County.

Soils

Rocky Mountain white fir grows on a variety of slightly to strongly acid soils from almost every type of parent material. Growth and development are best on moderately deep and well-drained sandy-loam to clay-loam soils, regardless of parent material.

ACGLD3 *Acer glabrum* var. *diffusum*

Rocky Mountain maple

Fire Effects

Though top-killed by fire, Rocky Mountain maple generally has low susceptibility to fire due to its ability to survive via sprouting from the root crown. Rocky Mountain maple may remain on sites where most of the understory vegetation is removed by fire. However, after moderate to severe fire, survival of Rocky Mountain maple may be substantially reduced. Generally, it is only temporarily reduced by fire because often the root crowns are so large that some buds always survive.

Grazing Effects

Rocky Mountain maple is generally an important browse species for domestic livestock and wildlife throughout its range. Big game animals generally consume the buds and current annual twig growth. However, Rocky Mountain maple often grows quickly out of reach. Though it is also browsed in the summer, Rocky Mountain maple may be heavily used in late fall and winter by mule deer. It is also important winter browse for bighorn sheep and elk.

Site Characteristics

Rocky Mountain maple commonly occurs as an understory species in a variety of coniferous forest types, as well as in upland deciduous and riparian forests throughout its range. Rocky Mountain maple also occurs in a variety of mixed shrub vegetation. Rocky Mountain maple occurs on wetlands, streambanks, canyons, and upland mountain slopes. Though it occurs on both moist and dry sites, Rocky Mountain maple is more closely tied to drainages in arid zones of its distribution, but occurs on drier exposures northward and at higher elevations. On upland sites, Rocky Mountain maple grows on lower, mid, and upper slopes, alluvial terraces, summits, ridgetops, snow chutes, and talus slopes.

Soils

Rocky Mountain maple occurs on silty, loamy, sandy, gravelly, and rocky soils, with a moderately acidic to slightly basic pH. It grows on sandstone, limestone, basalt, gneiss, rhyolite, calcareous, and granitic parent materials. Rocky Mountain maple grows on shallow as well as relatively deep, well developed soils. Rocky Mountain maple has high requirements of calcium, magnesium, nitrogen, potassium, and phosphorus.

JUOS *Juniperus osteosperma* Utah juniper

Fire Effects

Fire return intervals for Utah juniper communities range from 10 to 30 years. Utah juniper is usually killed by fire, especially when trees are small. However, Utah juniper habitat types rarely have sufficient fine fuels to produce severe or continuous fires. Vegetative recovery following a fire in a mature juniper site may be slow, since the pre-fire herbaceous cover is often sparse.

Grazing Effects

Utah juniper is used by and livestock for cover and food. Across the West, junipers have expanded their historical range in the years since European settlement, especially into sagebrush-grass communities below areas of traditional pinyon-juniper. Overgrazing, fire suppression, and climate change have been identified as potential causes of juniper invasion. After disturbance Utah juniper eventually dominate the site and crowd out herbaceous and shrub species. Utah juniper is used by many birds and wildlife for cover and food. The foliage is grazed by mule deer when other foliage is scarce and during periods of deep snow. Juniper berries or berry-cones are eaten by jackrabbits and coyotes. Many bird species depend on juniper berry-cones for fall and winter food. Utah juniper is used by many birds and wildlife for cover and food. The foliage is grazed by mule deer when other foliage is scarce and during periods of deep snow. Juniper berries or berry-cones are eaten by jackrabbits and coyotes. Many bird species depend on juniper berry-cones for fall and winter food.

Site Characteristics

Utah juniper is not shade tolerant. It is a climax species in harsh areas where stands are open and regeneration can occur without competition for light. Utah juniper commonly grows on alluvial fans and dry, rocky hillsides, with shallow, alkaline soils. Precipitation patterns in juniper communities vary, but Utah juniper is generally found in areas of 12 to 18 inches of precipitation, with extremes of below 10 inches/year to highs of 20 inches. Utah juniper occurs at 2,500 to 7,500 feet elevation in the Great Basin. It is found as high as 10,000 feet in the Sierra Nevada. Utah juniper is known in every county, but least common in the northwest corner.

Soils

Utah juniper is considered a sodium-sensitive species. Utah juniper is found on a range of soil textures, but most often on gravelly loams and gravelly clay loams with a pH range of 7.4 to 8.0. Utah juniper is also found on shallow, alkaline soils.

JUSC2 *Juniperus scopulorum* Rocky Mountain juniper

Fire Effects

Due to its thin bark and compact crown, Rocky Mountain juniper trees up to 3-4 feet tall are easily killed by fire. As trees mature, they develop thicker bark and a more open crown, allowing them to survive surface fires if the low, spreading branches do not carry fire to the crown. A severe fire, however, may damage or kill such trees. High volatile oil content, especially in the lower branches, also makes the trees more flammable. Rocky Mountain juniper does not resprout after top-kill. Post fire re-establishment is solely by seed, and animal transport of seeds is an important factor. Numerous seedlings often germinate after burning of old trees.

Grazing Effects

Rocky Mountain juniper is important forage and cover to many wildlife species. Palatability of Rocky Mountain juniper is rated poor to fair for livestock and wildlife.

Site Characteristics

Rocky Mountain juniper is most abundant in dry, clay, rocky, or sandy slopes, canyons and wash areas as well as prairie hillsides, fields, pastures, and woodlands. The species grows best along ravines, in canyon

bottoms, and on moist, cool hillsides. Rocky Mountain juniper can be found at elevations between 6,000 and 8,500 feet. Rocky Mountain juniper is generally found in dry, subhumid climates. It also grows in moist, subhumid regions in the northern part of its range and in semiarid regions in the central and southern parts of its range. Rocky Mountain juniper is adapted to dry climates and requires only about 10 inches of annual precipitation. The average annual precipitation in its range varies from 12 inches to 26 inches. Rocky Mountain juniper is common in northern and eastern Nevada, from the Jarbidge Mountains, in Elko County; southward to the Spring Mountains, Clark County.

Soils

Rocky Mountain juniper prefers calcareous and somewhat alkaline soils and grows best on moist, deep soils. The species is found on soils derived from basalt, limestone, sandstone, lavas, and shale. It also grows in many places where there is no developed soil.

PIFL2 *Pinus flexilis* limber pine

Fire Effects

Limber pine is often killed by fire because of its relatively thin bark. Mature trees with thicker bark can survive low-severity fires. Terminal buds are somewhat protected from the heat associated with crown scorch by the tight clusters of needles around them. The vulnerability of this species to fire is reduced by the open stand structure, sparse fuels, and sparse undergrowth of limber pine communities.

Grazing Effects

Sites with limber pine provide key winter range for deer and elk. Bighorn sheep use open stands on ridges. Difficult access and low grass production result in low forage value of limber pine stands for livestock.

Site Characteristics

Limber pine typically occurs on steep, rocky, well-drained, windswept, and nutrient-poor sites on exposed ridges and summits at elevations between 7,000 and 10,000 feet with average annual precipitation between 20 and 70 inches. Limber pine is scattered commonly throughout the state's mountains, except along the extreme western border counties.

Soils

Limber pine is often reported growing on calcareous soil at depths between 40 and 60 inches. It is also reported on soils derived from many other types of parent material.

PILO *Pinus longaeva* Great Basin bristlecone pine

Fire Effects

As a thin-barked pine, Great Basin bristlecone pine is adapted to survive only low-severity surface fires. Great Basin bristlecone pine seeds can colonize burns through wind dispersal. Fire is infrequent on high-elevation sites dominated by Great Basin bristlecone pine. Stands are very open, and productivity is low. Flammability of Great Basin bristlecone pine has not been examined. The wood and foliage are highly resinous. Because Great Basin bristlecone pine is a sun-tolerant, early seral species, post fire establishment seems likely on high-elevation sites.

Grazing Effects

Great Basin bristlecone pine-limber pine communities are high-use habitat for small birds and mammals. Great Basin bristlecone pines are a major source of cover for wildlife in high-elevation ecosystems.

Site Characteristics

Great Basin bristlecone pine communities usually merge with low sagebrush or limber pine communities at about 9,500 feet elevation, but sometimes merge with singleleaf pinyon-western juniper woodlands, particularly on Nevada's eastern slope. Across its range, Great Basin bristlecone pine occurs from 8,000 to 11,000 feet elevation. Great Basin bristlecone pine occurs in arid climates that are cold in winter and droughty in summer. Mean precipitation is 12 inches/year; about 2.5 inches of which is rainfall during the growing season. Great Basin bristlecone pine is scattered throughout eastern and east central Nevada from Indian Creek and Spruce Mountain, Elko County; west to the East Humboldt Mountains, Pershing County; south to Boundary Peak in the White Mountains, to the Silver Peak Mountains, Esmeralda County; to the far southern locations of the Sheep and Spring Mountains, Clark County.

Soils

Great Basin bristlecone pine is most common on thin, rocky substrates. Soils are usually derived from limestone or dolomite, although some populations grow on sandstone or quartzite.

PIMO *Pinus monophylla* singleleaf pinyon

Fire Effects

Historic fire frequency is varied. On high-productivity sites where sufficient fine fuels existed, singleleaf pinyon communities burned every 15 to 20 years, and on less productive sites with patchy fuels, fire return intervals may be in the range of 50 to 100 years or longer. Thin bark and lack of self-pruning make singleleaf pinyon very susceptible to intense fire. Mature singleleaf pinyon can survive low-severity surface fires but is killed by more severe fires. Most tree seedlings are killed by fire, but cached seeds may survive.

Grazing Effects

Across the West, singleleaf pinyon has expanded their historical range in the years since European settlement, especially into sagebrush-grass communities below areas of traditional pinyon-juniper. Overgrazing, fire suppression, and climate change have been identified as potential causes of singleleaf pinyon invasion. After disturbance singleleaf pinyon eventually dominate the site and crowd out herbaceous and shrub species. Pinyon-juniper woodlands provide shelter and forage for numerous species of wildlife, some of which may be obligate to these woodlands such as pinyon mice and woodrats. These forests have value as habitat for several large mammals such as mule deer, white-tailed deer, pronghorn, desert bighorn sheep, elk, wild horses, mountain lions, and bears. Although it is not favored, mule deer eat pinyon foliage, using the foliage moderately in winter, spring, and summer.

Site Characteristics

Singleleaf pinyon is adapted to a wide variety of sites. It usually grows on pediments, dry, rocky slopes, ridges, and alluvial fans and is rarely found on valley floors. Singleleaf pinyon may be found at elevations between 3,800 and 7,200 feet. The upper limit of singleleaf pinyon varies with climate and competing tree species, but

it has been found as high as 10,000 feet. Its mean annual precipitation range is 8 to 18 inches, with most precipitation falling December through April. Singleleaf pinyon is common throughout the state except for the northern border and the northwest corner.

Soils

Singleleaf pinyon typically grows on shallow, well-drained, low fertility soils, although it has been found on more productive soils as well.

PIPOS *Pinus ponderosa* var. *scopulorum*
Rocky Mountain ponderosa pine

Fire Effects

Ponderosa pine has evolved with a thick bark and open crown structure that allows it to survive most fires. Mature trees will self-prune, leaving a smooth bole which reduces aerial fire spread. Other fire adaptations include deep roots, high foliar moisture content, insulated bud scales, and medium to light lichen growth. Seedlings prefer the mineral-soil seedbeds created by fire. Fire also shapes the composition of ponderosa pine stands. Generally, well-spaced seedlings and saplings are able to withstand low-severity fires, as are pole-sized and mature trees. Moderate- to high-severity fires, however, will kill trees pole-sized and smaller. Mature ponderosa pines have a higher survival rate than younger trees due to their enhanced adaptations to fire. The principal cause of mortality following fire is crown scorch rather than damage to the cambium or roots. Fire creates favorable seedbeds for seedling establishment. The soil is often rich in available inorganic nitrogen that benefits tree growth.

Grazing Effects

Large browse mammals such as elk, deer, porcupines, hares, rabbits, cattle, sheep, and occasionally horses, goats, and feral hogs will browse ponderosa pine. Ponderosa pine is considered low in palatability for cattle, horses, and sheep. Elk also find it unpalatable. Elk, along with deer and bighorn sheep, occasionally browse on stems and bark during times of food or water scarcity. Shrubs and grass compose ponderosa pine understory, which livestock and wildlife will also graze.

Site Characteristics

Ponderosa pine is typically found on warm, dry sites. The climate is characterized by a short growing season and minimal summer precipitation. The mean annual precipitation ranges from 11 to 20 inches, with summer precipitation averaging 5 to 10 inches, and is typically in the form of snow. Ponderosa pine can be found at elevations between 5,000 and 7,500 feet. Ponderosa pine is common throughout both the eastern and western borders of the state.

Soils

Ponderosa pine occurs on a wide variety of soils ranging from glacial till, glacio-fluvial sand and gravel, dune, basaltic rubble, colluvium, to deep loess or volcanic ash. This pine develops best on wet, deep, sandy gravel and clay loams with pH between 6.0 and 7.0. Throughout its extensive range, however, it will most often be found on a variety of loams, loamy sand, and gravel; with a pH from 4.9 to 9.1.

POFR2 *Populus fremontii* Fremont's cottonwood

Fire Effects

Mature Fremont cottonwood trees are top-killed by moderate fire. The cambium layer is damaged by even low-severity surface fire. Fremont cottonwoods that are top-killed by fire sprout vigorously from the root crowns. Coppice sprouting is the predominant mechanism of vegetative reproduction in most areas. Disturbances such as fire may favor seedling regeneration. Fire thins the over story and surrounding vegetation, allowing light to penetrate, and exposes mineral soil.

Grazing Effects

Fremont cottonwood communities provide shade for domestic livestock; provide a food source for elk and deer. Palatability is rated as poor to fair for domestic livestock and wildlife species. Cattle grazing will prevent successful regeneration of Fremont cottonwood seedlings.

Site Characteristics

Fremont cottonwood occurs in riparian communities. It grows primarily on alluvial soil and on other sites where subsurface water is available during the growing season, such as near water tanks, along irrigation ditches, dry washes, floodplains of

major rivers, large perennial streams, springs, and in desert oases. Large, mature trees are generally found close to the main channel, while the seedlings and saplings are located on the widest parts of the floodplain. Fremont's cottonwood occurs in wet areas of springs, riverbanks and streambanks within creosotebush and sagebrush deserts to pinyon-juniper woodlands at elevations between 2,200 and 7,000 feet. Fremont's cottonwood is common in southern, west central and western Nevada.

Soils

Fremont's cottonwood grows on well-drained, alluvial, sandy to sandy clay loams with varying degrees of organic matter, clay or other fine soil and rock deposits, coarse, rocky and sterile soils, and fine-grained alluvial substrates. It has also been described as fairly salt tolerant.

POTR5 *Populus tremuloides* quaking aspen

Fire Effects

The most important agent of disturbance in aspen forests before 1900 was fire, although other natural disturbances were locally important including wind throw, snow damage, hail, lightning, fungal diseases and insect damage. Most aspen forests in the West are seral and have been dependent upon fire for their perpetuation. If fire occurs at infrequent intervals (e.g. 50-150 years) and is intense enough to kill most of the aspen and competing conifers, then most aspen sites in the West will retain viable stands of aspen. Periodic wildfires prevent over-mature aspen stands and maintain a naturally stratified mosaic of even-aged aspen communities in various stages of successional development. Uneven-aged stands form under stable conditions where the over-story gradually disintegrates with disease or age, and is replaced by aspen suckers. Although aspen forests do not burn readily, aspen trees are extremely sensitive to fire. A severe fire will top-kill the aspen over story and will stimulate abundant suckering. A severe fire also removes the duff and may kill roots. Repeated fires have a detrimental effect on site quality and can eliminate aspen from a site.

Aspen is highly competitive on burned sites and has several adaptations to fire including

the following: a) the thin bark has little heat resistance, and aspen is easily top-killed by fire, b) root systems of top-killed stems send up a profusion of sprouts for several years after fire, c) sprouts grow rapidly by extracting water, nutrients, and photosynthate from an extant root system, and may out compete other woody vegetation, d) following fire, a new, even-aged quaking aspen stand can develop within a decade, and e) aspen is self-thinning and a mature forest of healthy trees can develop from dense sprouts.

Grazing Effects

Quaking aspens understory is composed of a mix of shrubs, grasses and forbs that provide feed for many wildlife species and livestock. Quaking aspen forests provide important breeding and resting habitat for a variety of birds and mammals. Elk browse quaking aspen year-round, feeding on bark, branch apices, and sprouts. Quaking aspen is important forage for mule deer. Deer consume the leaves, buds, twigs, bark, and sprouts. Most classes of domestic livestock use quaking aspen. Domestic sheep and cattle browse the leaves and twigs. Domestic sheep browse quaking aspen more heavily than cattle. Heavy browsing can adversely impact quaking aspen growth and regeneration by shifting the plant community to lower palatable plant species.

Site Characteristics

Quaking aspen grows on moist upland woods, dry mountainsides, high plateaus, mesas, avalanche chutes, talus, parklands, gentle slopes near valley bottoms, alluvial terraces, and along watercourses. Quaking aspen spans an elevational range from 6,000 to 9,500 feet with average annual precipitation between 14 and 25 inches. Quaking aspen is commonly found throughout the state and nearly certain to be in every county.

Soils

Quaking aspen grows on soils ranging from shallow and rocky to deep loamy sands and heavy clays. Quaking aspen soils are usually well drained, loamy, and high in organic matter and nutrients.

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