

GUIDE TO VEGETATION COMMUNITY CODES

The following guide supplies information for filling out 310 - Part A, Environmental Data - 34. Vegetation. Definitions are supplied for the various vegetation communities. The definitions are ordered on the basis of ascending elevation, as shown on the chart below.

<u>Community</u>	<u>Code</u>
Creosote Bush	Y
Blackbrush	V
Shadscale	O
Big (Tall) Sagebrush	P
Little (Low) Sagebrush	Q
Pinyon-Juniper	H
Oak-Maple Shrubland	K
Dry Meadow	J
Wet Meadow	I
Ponderosa Pine	E
AspenA	
Douglas Fir	C
Lodgepole Pine	F
Spruce/Fir	B
Alpine Tundra	D

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The following is either paraphrased or verbatim from Intermountain Flora by A. Cronquist, A. Holmgren, N. Holmgren, and J. Reveal, Volume 1, 1972, Hafner Publishing Company, Inc. pp. 109-131.

We have modified Cronquist, et al. "zones" somewhat and used here to illustrate what is called "community" in IMACS. They are only roughly equivalent. Following the community code name is the appropriate IMACS code.

This breakdown of the Intermountain Region into vegetation zones is taken in part from Billings (1951) who subdivided the Great Basin into zones that can easily be recognized. For a good review of different treatments of vegetation zones in the Intermountain Region, see Graham (1937), who reviews the concepts of Merriam (1898), Jones (1910), Rydberg (1916, 1922), Tidestrom (1925), Shantz (1925), Sampson (1925), Cottam (1929), Svihla (1932), and Dixon (1935).

A vegetation zone is, according to Billings (1951, p.103), "a large climax unit whose boundaries are caused primarily by the effects of climate and soil on the distribution of the dominant species of the zone." In the Intermountain Region the boundaries are irregular, due to topographic and geologic variation and their consequent effects on microclimates. Adding to the complexity of delineating a vegetation zone is the mosaic of smaller groupings of species due to even smaller environmental differences. Also, throughout most of any given zone there is a gradient from one environment to another which is often gradual so that the climax vegetation shows gradual shifts in composition from place to place. There are, on the other hand, a vast amount of instances of sharp differences between vegetation types where there are water courses, steep mountain slopes, or abrupt edaphic (soil) changes. The exact boundaries in the kind of macro-classification into which a vegetation zone fits are necessarily arbitrary, since the different influences suggested above result in the merging or interfingering of different zones.

In Intermontane Valley Zones are Creosote Bush (Warm Desert Shrub), Shadscale (Salt Desert Shrub), Sagebrush, and Pinyon-Juniper. They replace each other more or less latitudinally from south to north, and altitudinally from low to high elevations. The Creosote Bush Zone is replaced approximately along the 37th parallel by the Shadscale Zone. The Shadscale Zone extends northward in the valley bottoms. In the low depressions of the Lahontan and Bonneville basins it extends up to the 42nd parallel. The northernmost Sagebrush Zone extends south along the slopes of the mountains so that the boundary between this and the Shadscale Zone tends to dovetail considerably. The Pinyon-Juniper Zone is more or less associated with the mountains but is common enough in the higher valleys to be considered with the Valley Zones.

The community descriptions presented here are generalized to cover many different local environmental variations. It would be a rare case to find that a community description and plant list duplicates the field situation. The guide should be used to help the field archeologist make a reasonable assessment of community type by comparing the field situation to the community descriptions and encoding the best match.

On-Site Community Codes:

(A) Aspen	(O) Shadscale/Greasewood
(B) Spruce/Fir	(P) big Sagebrush
(C) Douglas Fir	(Q) Little Sagebrush (Low Sagebrush)
(D) Alpine	(R) Barren
(E) Ponderosa	(S) Marsh/Swamp
(F) Lodgepole Pine	(T) Lake/Reservoir
(G) Other/Mixed Conifer Forest	(U) Agricultural/Developed/Seedings
(H) Pinyon-Juniper	(X) Prairie (short grasses)
(I) Wet Meadow	(W) Mountain Brush
(J) Dry Meadow	(Z) Juniper/Sage
(K) Oak-Maple Shrubland (deciduous tree/shrub)	(Z) Unknown
(L) Riparian	
(M) Grassland/Steppe (bunch grasses)	

(A) Aspen Community

Aspen (*Populus tremuloides*), is scattered throughout the upper levels of the Douglas fir zone, but at lower levels may be restricted to stream-side sites. Aspen often forms pure stands or dominates a community consisting of smaller trees and shrubs. The aspen, frequently found in burned-over areas, has the reputation of being an invader of burns.

Aspen is common and often forms large clones throughout the mountainous areas of Wyoming, mostly at 6,000 - 10,000 feet but at somewhat lower elevations in the Black Hills of northeastern Wyoming.

Some of the associated plants are:

Acer glabrum (Rocky Mountain maple)
Acer grandidentatum (big tooth maple)
Berberis repens (Oregon grape)
Betula occidentalis (western water birch)
Bromus anomalus (nodding brome)
Carex geyeri (elk sedge)
Geranium spp. (geranium)
Hydrophyllum capitatum (waterleaf)
Juniperus communis (creeping juniper)
Lupinus spp. (lupine)
Melica spp. (onion grass)

Nemophila breviflora (nemophila)
Penstemon subglaber (penstemon)
Phacelia sericea (phacelia, purple fringe)
Poa pratensis (Kentucky bluegrass)
Poa nervosa (Wheeler bluegrass)
Populus angustifolia (narrow leaf cottonwood)
Salix spp. (willow)
Scrophularia lanceolata (figwort)
Smilacina spp. (false soloman's seal)
Stipa columbiana (columbia needlegrass)
Symphoricarpos oreophilus (snowberry)
Thalictrum fendleri (meadow-rue)
Wyethia amplexicaulis (mules-ear)

(B) Spruce/Fir Forest

This is the characteristic element at the upper limit of trees, but may extend downward along streams into lower valleys. Near its upper limit the trees are scattered, but the main belt is almost continuous forest. The chief trees are englemann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*), but in northwestern Wyoming whitebark pine (*Pineus albicaulis*) is a frequent constituent, particularly on rocky or exposed sites. In mature stands the understory is frequently composed of grouse whortleberry (*Vaccinium scoparium*). At the upper limit of this forest the trees become dwarfed, forming characteristic wind-timber islands of trees contorted by high winds and blowing snow. Within the forest, in more open situations or along streams, we find numerous willows and aspen (*Populus tremuloides*).

Abies lasiocarpa (subalpine fir)
Picea engelmannii (englemann spruce)
Pinus albicaulis (whitebark pine)
Pinus flexilis (limber pine)
Populus tremuloides (aspen)

The most common understory taxa are:

Artostaphylos uva-urse (manzanita, bearberry)
Arnica cordifolia
Artemisia tridentata (big sagebrush)
Camanula rotundifolia (common harebell)
Cares spp. (sedge)
Chrysothamnus viscidiflorus (rabbitbrush)
Calamagrostis spp. (pinegrass)
Fragaria virginiana (strawberry)
Juniperus communis var. *depressa* (common juniper)
Penstemon whippleanus (penstemon)
Phlox spp. (phlox)
Pyroela spp.
Ribes cereum (wax or squaw currant)
Ribes montigenum (mountain currant)
Rebus ideaeus (raspberry)
Sambucus racemosa (red elderberry)

Stipa spp. (needlegrasses)
Symphoricarpos oreophilus (mountain snowberry)
Trisetum spicatum (spike trisetum)
Vaccinium scoparium (grouse whortleberry)

(C) Douglas Fir Community

Douglas fir (*Pseudotsuga menziesii*), has a wide ecological amplitude, usually dominating most of the areas under different climatic and edaphic influence within the Canadian zone and often extending to lower elevations than other tree species of the zone. The blue spruce, *Picea pungens*, is common to this community in the southern parts of the region but is only found along the extreme western edge of Wyoming and in the southern parts of the Medicine Bow Mountains. In dry areas and exposed slopes in the upper reaches of this zone, the limber pine (*Pinus flexilis*) is common. Similar habitats at lower elevations are often occupied by ponderosa pine (*Pinus ponderosa*).

Common trees are:

Abies concolor (white fir)
Picea pungens (blue spruce)
Pinus flexilis (limber pine)
Pinus ponderosa (ponderosa pine)
Populus tremuloides (aspen)
Pseudotsuga menziesii (Douglas fir)

As one ascends in elevation, winds become stronger. The dense stands of Douglas fir and aspen growing close together receive mutual protection from their own kind thus acting as windbreaks against toppling in the highwinds. The canopy allows less light to penetrate than in the open ponderosa pine forests. Only shrubs and trees that can tolerate the reduced shade produced by the fir and aspen can survive here.

Such plants, among others, are:

Amelanchier alnifolia (serviceberry)
Berberis repens (Oregon grape)
Cornus stolonifera (red osier dogwood, kinnikinnik)
Lonicera spp. (honeysuckle)
Pachistma myrsinites (mountain clover, myrtle)
Prunus virginiana (chokecherry)
Ribes cereum (wax currant)
Ribes montigenus (mountain gooseberry)
Rubus parviflorus (thimbleberry)
Rubus ideaus (raspberry)
Salix spp. (willow)
Sambucus cerulea (blue elderberry)
Sorbus scopulina (mountain ash)
Vaccinium scoparium (grouse whortleberry)

(D) Alpine

The alpine tundra typically consists of low perennial herbs. The climatic forces are too severe for the growth of trees. Most of the communities represent early successional stages because not only have they recently been exposed by the retreat of the Pleistocene glaciers, but the plants have such short growing seasons and are exposed to freezing night temperatures. The soils are usually shallow and poorly decomposed. Also the ruggedness of the mountain top terrain allows few places for soil to develop. Most alpine situations in the Intermountain Region are limited to the tops of mountain peaks and consist almost entirely of rock slides and deep piles of loose boulders with very few environments suitable for the development of vegetation. In the Uinta Mountains, however, a good proportion of this alpine area consists of gently undulating terrain providing an environment more similar to that found in the arctic regions. A good source for more information on this zone is Lewis (1970).

In Wyoming this zone is mostly above 10,500 feet in elevation. It is composed of alpine tundra, rocky summits, scree slopes, alpine lakes, meadows, stream channels, permanent or temporary snowbanks, and in some places glaciers. The vegetation is chiefly herbaceous, with a few low or dwarf shrubs.

Woody species found here include:

Juniperus communis (common juniper)
Potentilla fruticosa (shrubby cinquefoil)
Ribes montigenum (mountain currant, gooseberry)
Phleum aplanum (alpine timothy)
Salix brachycarpa (barren ground willow)
Salix spp. (dwarf or shrubby willows)

Other associated plants include:

Agropyron spp. (wheatgrass)
Agrostis variabilis (red top)
Carex spp. (sedge)
Deschampsia cespitosa (oatgrass, tufted hairgrass)
Festuca ovina (sheep fescue)
Juncus spp. (rush)
Muhlenbergia filiformis (pull-up muhly)
Phleum aplanum (alpine timothy)
Poa alpina (alpine bluegrass)
Polygonum spp. (bistorts, knotweed, smartweed)
Trifolium spp. (clover)
Trisetum spicatum (spike trisetum)

Many of these plants are found in all the alpine zones of Wyoming, but some of them have thus far been observed only in northwestern Wyoming, where the best development of this zone occurs in the Wind River Range and on the Beartooth Plateau.

The principal forbs are:

Astragalus playtopis (milkvetch)
Castilleja spp. (Indian paintbrush)
Draba spp. (whitlow-wort)
Erigeron compositus (daisy)
Geum rossii var. *turbinatum* (avens)
Lewisia pygmaea (pigmy bitterroot)
Lupinus argenteus (lupine)
Mertensia ciliata (tall bluebell)
Oxyria digyna (alpine sorrel)
Penstemon spp.
Polemonium viscosum (sky pilot)
Polygonum bistortoides (knotweed)
Potentilla diversifolia (cinquefoil)
Ranunculus eschscholtzii var. *alpinus* (subalpine buttercup)
Saxifraga caespitosa (matted saxifrage)
Senecio werneriaefolius (golden ragwort)
Silene acaulis (moss-pink)
Smelowskia calycina var. *americana* (smelowskia)
Vaccinium caespitosum (blueberry)

(E) Ponderosa Pine Community

Both the oak-maple shrub (chaparral) and ponderosa pine occupy more or less the same altitudinal belt, which lies between 5,000 and 7,000 feet in the Wasatch Range and between 6500 and about 9000 feet at the more southern latitudes. Ponderosa pine, *Pinus ponderosa*, is called yellow pine by some authors. The ponderosa pine communities are open forest with medium tall to tall trees (up to 100 feet tall) with a relatively sparse understory of various admixtures of shrubs and herbs. Even though the sunlight reaches the ground in almost all parts of such a forest, the shrub layer is relatively spotty compared to its development in the ponderosa pine forests of the Northwest. The soil is relatively dry and sandy, containing little or no humus. The trees are straight and evenly spaced with the forest consisting of widely spaced individuals or the trees may grow in relatively open, parklike stands on rather dry hillsides and plateaus. On the cool north slopes, the stands of ponderosa pine tend to be thicker, and the douglas fir intermingles with them, and in the upper parts, aspen creeps downward to associate with the ponderosas.

Characteristic shrubs are:

Acer glabrum (Rocky Mountain maple)
Amelanchier alnifolia (serviceberry)
Arctostaphylos spp. (manzanita, bearberry)
Berberis repens (Oregon grape)
Ceanothus fendleri (Fendler buckbrush)
Chrysothamnus parryi (rabbitbrush, montane)
Crataegus rivularis (hawthorn)
Juniperus scopulorum (Rocky Mountain juniper)
Purshia tridentata (bitterbrush, antelope brush)
Ribes cereum (wax currant)

Robina neomexicana (New Mexican locust)
Subus spp. (raspberry)
Sambucus coerluea (blue elderberry)
Symphoricarpos spp. (snowberry)

The most common grasses are:

Agropyron spp. (wheatgrasses)
Blepharoneuron tricholepis (hairy dropseed)
Calamagrostis spp. (pinegrasses)
Muhlenbergia montana (muhly)
Sitanion hystrix (squirreltail)
Stipa spp. (needlegrasses)

Common forbs are:

Astragalus spp. (milkvetch)
Castilleja linariaefolia (Wyoming paintbrush)
Erigeron divergens (spreading fleabane, daisy)
Eriogonum spp. (buckwheat)
Lewisia rediviva (bitterroot)
Lupinus spp. (lupine)
Potentilla spp. (cinquefoil)
Prunus virginiana (chokecherry)
Rosa woodsii (woods rose)

(F) Lodgepole Pine Forest

The lodgepole pine, *Pinus contorta* var. *latifolia*, dominates an altitudinal belt between 9,000 and 10,000 feet in the Uinta Mountains. It is known to invade recently burned areas. The Rocky Mountain lodgepole pine is a closed-cone species. Such cones retain the seeds for long periods of time but readily release them following a fire or a cutting. The resulting forests are characterized by uniformly thick stands "thick as hairs on a dogs back" where the dense shade prevents the propagation of its own seedlings. The trees are so crowded together that it is almost impossible to push through them. The trunk diameter is commonly no more than a foot, with "doghair" stands averaging more like 5 to 6 inches. In such groves, the trees seldom exceed 75 feet in height and bear branches only near their tops (Elmore 1976:181).

The lodgepole pine invades the burns in the lower levels of the Englemann spruce-Subalpine Fir zone where its role as the preclimax is evident for the climax species are seen gradually replacing the lodgepole pine. Lodgepole pine is present only in small quantities in the Wasatch Range. In the mountains just north of the Wasatch it dominates as it does in the Uinta Mountains.

Common taxa in the understory are:

Arctostaphylos uva-ursi (manzanita)
Arnica cordifolia (arnica)
Betula occidentalis (western water birch)

Ceanothus velutinus (sticky-laurel)
Cercocarpus montanus (alderleaf mountain mahogany)
Chrysothamnus viscidiflorus (rabbitbrush)
Gutierrezia sarothrae (snakeweed)
Juniperus communis var. *depressa* (common juniper)
Pachistima myrsinities (mountain lover)
Pedicularis racemosa var. *alba* (lousewort)
Populus angustifolia (narrowleaf cottonwood)
Prunus virginiana (chokecherry)
Purshia tridentata (bitterbrush)
Rhus trilobata (squawbrush)
Ribes cereum (wax currant)
Ribes spp. (currant)
Rosa woodsii (woods rose)
Rubus parviflorus (thimbleberry)
Salix spp. (willow)
Sambucus cerula (red elderberry)
Sambucus racemosa var. *microbotrys* (elderberry)
Symphoricarpos oreophilus (mountain snowberry)
Vaccinium scoparium (broom huckleberry)

The common herbaceous species are:

Agropyron spp. (wheatgrass)
Delphinium nelsonii (larkspur)
Elymus cinereus (giant wild rye)
Erigeron flagellaris (trailing fleabane)
Geranium fremontii (fremont geranium)
Poa pratensis (Kentucky geranium)
Stipa spp. (needlegrass)
Viguiera multiflora (showy goldeneye)
Wyethia amplexicaulis (mules-ear)

In Wyoming: Occupying the middle part of the timbered mountain slopes there is usually present a broad and dense forest of lodgepole pine (*Pinus contorta* spp. *latifolia*). This belt of coniferous forest is often the most conspicuous part of the mountain slopes. Occasional mature stands occur, with well-spaced trees and an understory of shrubs such as Canadian buffaloberry (*Shepherdia canadensis*) and common juniper (*Juniperus communis*). But commercial logging as well as fire have resulted in most of the stands being less mature and more dense. After fire, particularly, this forest returns as a very dense and slowly maturing stand of closely spaced, slender trees, with very little development of an under-story. Here, also, we find numerous streams, ponds, and lakes that are highly productive of plant life. There are frequent openings or parks that are grassy or are occupied by sagebrush (*Artemisia tridentata*). Aspen occurs as a conspicuous element around the edges of the forest, and in moist situation along streams are numerous willows.

Common trees are:

Pinus contorta (lodgepole pine)
Populus tremuloides (aspen)

Common understory taxa are:

Abies lasiocarpa (subalpine fir)
Artemisia tridentata (big sagebrush)
Juniperus communis (common juniper)
Picea engelmannii (englemann spruce)
Shepherdia canadensis (Canadian buffaloberry)
Vaccinium scoparium (grouse whortleberry)

(G) Mixed Conifer Forest

This forest type marks the lower limit of the tree-clad mountain slopes, occurring below the lodgepole pine forest and extending downward in a rather narrow belt to the open foothills. In northeastern Wyoming, however, and in scattered areas in eastern Wyoming generally, this is often a broad belt extending out onto the plains. The chief trees are ponderosa pine (*Pinus ponderosa* var. *scopulorum*) and Douglas fir (*Pseudotsuga menziesii* var. *glauca*), but we find limber pine (*Pinus flexilis*) and aspen (*Populus tremuloides*) associated with them in many places. The forest is more open than the lodgepole pine forest, the trees often being widely spaced. The common understory is sagebrush (*Artemisia tridentata*) and bitterbrush (*Purshia tridentata*). On the more sheltered and moister slopes there is sometimes an almost pure stand of Douglas fir. Limber pine is usually associated with exposed, rocky sites. Along the lower streams balsam poplar (*Populus balsamifera*) may occur as scattered individuals or a nearly pure stand.

Some of the associated plants are:

Artemisia tridentata (big sagebrush)
Pinus flexilis (limber pine)
Pinus ponderosa (ponderosa pine)
Populus balsamifera (balsam poplar)
Populus tremuloides (aspen)
Pseudotsuga menziesii (Douglas fir)
Purshia tridentata (bitterbrush, antelope brush)

(H) Pinyon-Juniper Community

The Pinyon-Juniper zone is often treated as a montane zone. This forest type occupies more area in the Intermountain Region than all the other forest types combined. The elevational range of the zone varies, but it usually is found between 5000 and 8000 feet, with the lower limits determined by lack of moisture. The pinyon-juniper woodland develops in areas where the annual precipitation is usually in excess of about 12 inches. This zone has been variously called the Upper Sonoran Zone, Plains or Woodlands Zone.

Structurally the pinyon-juniper community consists of low, evergreen trees which rarely exceed 20 feet in height, are usually spaced far enough apart that their branches do not touch, and have an understory of varying admixture of shrubs and herbaceous plants, often with nearly bare ground.

Although rather uniform in basic structure throughout the Region, the p-j woodland changes composition both altitudinally and geographically. The juniper is found in pure stands at the lower elevational limits of the zone and often extends into the Sagebrush Zone along the side of draws. At somewhat higher elevations the pinyon enters the association, forming a mixed woodland throughout the middle part and eventually replacing the juniper in the extreme upper limits.

The singleleaf pinyon, *Pinus monophylla*, is the pinyon throughout most of the Great Basin. It is replaced in the mountain ranges along the eastern side of the Basin by *Pinus edulis*, two needle pinyon, which is the pinyon throughout the Colorado Plateau and the Uinta Mountains.

The Utah juniper, *Juniper osteosperma*, is the most common species of juniper in the Intermountain Region. It is a relatively short tree rarely exceeding 20 feet in height, is typically shrub like in form, with more than one main branch arising at or near the ground level.

In all except the western part of the Region, the Rocky Mountain juniper, *Juniperus scopulorum*, occurs along streams and in dry washes where it often extends up into the next zone. Apparently it is less drought-enduring than *J. osteosperma* and is less frequent. The Rocky Mtn. juniper is a larger tree, up to 30 or 40 feet in height with a central trunk.

Just entering our Region in southeastern Utah (San Juan and Kane counties), the one-seed juniper, *J. monosperma*, a small shrubby tree, dominates the drier sites. In this region it is the first arborescent species that one sees going from lower to higher elevations, where the Utah juniper and pinyon replace it.

Big sagebrush (*Artemisia tridentata*) is the common undercover shrub of the p-j woodland. Cacti and yuccas creep upward into the lower reaches and scraggly ponderosa pines edge downward into the upper border along with Gambel oaks. Along the streams grow cottonwoods, walnuts and sycamores, while on drier sites you can find such as rabbitbrush, fernbush, cliffrose, Apache-plume, squaw bush and scrub oak, any of which may assume local dominance (Elmore 1976:13).

Dominant trees:

- Pinus edulis* (two-needle pinyon)
- Pinus monophylla* (single-needle pinyon)
- Juniperus monosperma* (one-seed juniper)

Juniperus osteosperma (Utah juniper)
Juniperus scopulorum (Rocky Mountain juniper)

Some of the other more or less common shrubs are:

Acer glabrum (Rocky Mountain maple)
Amelanchier alnifolia (serviceberry)
Ceanothus velutinus (mountain lilac)
Cercocarpus ledifolius (curl-leaf mountain mahogany)
Chrysothamnus nauseosus (big rabbitbrush)
Chrysothamnus viscidiflorus (rabbitbrush)
Cowania mexicana var. *stansburiana* (stansbury cliffrose)
Ephedra viridis (Mormon tea)
Gutierrezia sarothrae (snakeweed)
Holodiscus dumosus (rock spiraea)
Purshia tridentata (bitterbrush)
Quercus gambelii (Gambel oak)
Ribes cereum (wax gooseberry)
Ribes velutinum (gooseberry)
Sambucus racemosa (red elderberry)
Symphoricarpos oreophilus (mountain snowberry)
Tetradymia canescens (horsebrush)

The most common grasses, which are more abundant in the northern parts of the Region are:

Agropyron smithii (western wheatgrass)
Agropyron spicatum (bluebunch wheatgrass)
Bouteloua gracilis (blue grama)
Festuca idahoensis (bluebunch fescue)
Koeleria cristata (prairie junegrass)
Oryzopsis hymenoides (Indian ricegrass)
Poa fendleriana (muttongrass)
Poa sandbergii (sandberg bluegrass)
Sitanion hystrix (squirreltail)
Sporobolus cryptandrus (sand dropseed)
Stipa columbiana (subalpine needlegrass)
Stipa comata (needle and thread)
Stipa thurberiana (thurber needlegrass)

Some of the common forbs are:

Astragalus spp. (milkvetch)
Balsamorhiza sagittata (arrowleaf balsamroot)
Erigeron spp. (daisy)
Eriogonum spp. (buckwheat)
Gilia aggregata (skyrocket)
Grindelia squarrosa (gumweed)
Lupinus sericeus (silky lupine)
Penstemon spp. (penstemon)

(I) Wet Meadow Community

The wet meadow community typically occupies level to nearly level stream valley bottoms and lowlands with a fairly high water table. Meadows and lakes are also frequently found associated with spruce-fir forests. The majority of these wet meadows represent advanced stages in the gradual filling in of the shallower glacial lakes.

In the wet meadows bordering the lakes, streams, and filled in lakes are such plants as:

Agrostis thurberiana (thurber redtop, thurber bentgrass)
Betula spp. (birch)
Caltha leptosepala (marsh marigold)
Castilleja spp. (paintbrush)
Cares spp. (sedge)
Deschampsia cespitosa (tufted hairgrass)
Erigeron spp. (daisy)
Juncus spp. (rush)
Kalmia polifolia var. *microphylla* (swamp laurel, bog laurel)
Lonicera involucrata (bush honeysuckle)
Luzula spp. (wood-rush)
Menyanthes trifoliata (buckbean, bog bean, marsh trefoil)
Mertensia ciliata (tall bluebells)
Mimulus lewisii (monkey flower)
Pedicularis groenlandica (elephantella, elephanthead lousewort)
Phleum alpinum (alpine timothy)
Poa spp. (bluegrass)
Polygonum bistortoides (knotweed, bistort)
Potentilla fruticosa (shrubby cinquefoil)
Primula parryi (parry primrose)
Ranunculus spp. (buttercup)
Rumex spp. (dock)
Salix phylicifolia (planeleaf willow)
Sparganium angustifolium (narrow-leaf bur-reed)
Vaccinium occidentale (blueberry)

(J) Dry Meadow

"Dry" meadows, also called mountain parkland meadows, typically occur on level to sloping topography of 20 percent or less along drainages and basins at elevations from 8,500 to 10,000 feet. This community type often exhibits frost hummocks and usually intergrades with the spruce/fir and other conifer forests. They are characterized by an abundance of forbs, cool season grasses, and sedges. The species composition of these herbaceous dry meadows varies greatly from place to place, depending on the angle and direction of the slope, the physical properties of the soils, altitude, and moisture availability. The dominant vegetation varies from a sedge/willow aspect on moist sites to a grass/forb aspect on the drier areas.

They may contain the following taxa:

Achillea millefolium var. *lanulosa* (yarrow)
Agropyron spp. (wheatgrass)
Agrostis spp. (redtop, bentgrass)
Artemisia frigida (fringed mountain-sage, pasture mountain-sage)
Artemisia michauxiana
Aster foliaceus (aster)
Bromus spp. (brome)
Carex spp. (sedge)
Castilleja sulphurea (yellow paintbrush)
Cirsium spp. (thistle)
Delphinium barbeyi (subalpine larkspur)
Deschampsia cespitosa (tufted hairgrass)
Festuca spp. (fescue)
Geranium richardsonii (white geranium)
Lewisia pygmaea (pigmy bitterroot)
Ligusticum filicinum (fern-leaf lovage)
Muhlenbergia filiformis (pull-up muhly)
Pedicularis racemosa var. *alba* (curled lousewort)
Penstemon spp. (penstemon)
Phacelia heterophylla (caterpillar plant, varileaf phacelia)
Phleum alpinum (alpine timothy)
Poa spp. (bluegrass)
Polygonum bistortoides (knotweed, bistorts)
Ranunculus escholtzii (alpine buttercup)
Rumex paucifolius (dock)
Saxifraga rhomboidea (saxifrage, diamondleaf)
Stipa columbiana (subalpine needlegrass)
Stipa lettermanii (letterman needlegrass)
Taraxacum officinale (common dandelion)
Trisetum spicatum (spike trisetum)
Vaccinium spp. (blueberry, huckleberry)
Viguiera multiflora (showy goldeneye)
Viola spp. (violet)

(K) Oak-maple Shrubland Community

The oak-maple shrubland (chaparral or shrub woodland) consists of deciduous or semi-deciduous large shrubs that form dense to open vegetation. The dominant species over most of the area are Gambel oak (*Quercus gambelii*) and big-tooth maple (*Acer grandidentatum*). In northern Utah this zone is transitional between the sagebrush zone and the typical Wasatch chaparral from further south. Big sagebrush (*Artemisia tridentata*) may dominate the lower limits and mountain mahogany (*Cercocarpus ledifolius*) the upper, with a deep penetration from the zone above of Douglas Fir (*pseudotsuga menziesii*) and aspen (*Populus tremuloides*) on the north-facing slopes. Further south in the Wasatch Range, on the lower slopes overlooking Salt Lake and Utah valleys, is the more characteristic Gambel oak/bit-tooth maple vegetation which extends from about the highest shoreline of old Lake Bonneville at about 5100 feet to an average of 7500 feet. There is the usual extension of the zone upwards on the southern-facing slopes and downward on the cooler north-facing slopes. It is

characterized by thickets of tall shrubs when the Gambel oak is the dominant species.

Throughout the range of the chaparral formation, mountain mahogany usually dominates the upper limits, sometimes forming a woodland. In the loccolithic mountains the Gambel oak forms interrupted communities between 6000 and 8000 feet in the draws, alternating variously with pinyon-juniper woodland and ponderosa pine forest.

In Wyoming: The typical oak-maple shrubland as described in the IMACS Guide is not found in Wyoming. Gambel oak (*Quercus gambelii*) is not known to occur in the State except possibly in the extreme southwest corner of the State and in the Big Horn Mountains. Big-tooth maple is known almost exclusively from the western slopes of the Big Horn Mountains in association with mountain mahogany. Most Wyoming "shrub-woodland" communities would more appropriately be categorized as (W) (mountain brush); however, there are many areas of the State where deciduous trees and shrubs are found in sufficient quantities to be considered communities. Areas of the Black Hills, for example, where bur oak (*Quercus macroparpa*) and boxelder (*Acer negundo*) dominate should be coded to this community.

The following taxa are found here:

Acer grandidentatum (big-tooth maple)
Acer glabrum (Rocky Mountain maple)
Acer negundo (boxelder)
Amelanchier alnifolia (serviceberry)
Amelanchier utahensis (Utah serviceberry)
Artemisia arbuscula var. *nova* (black sagebrush)
Artemisia tridentata (big sagebrush)
Cercocarpus ledifolius (curlleaf mountain mahogany)
Quercus macroparpa (bur oak)
Quercus gambelii (Gambel oak)

(L) Riparian

Riparian communities are those in which the vegetation is related to, living on, or located on the bank of a natural watercourse. The term riparian is sometimes, but rarely, applied to lakes. Along major drainages such as those of the North Platte, Powder, Big Horn, and Green rivers, the bottom land is usually wooded, the chief tree being plains cottonwood (*Populus sargentii*), often associated with boxelder (*Acer negundo*) and peach-leaved willow (*Salix amygdaloides*). In northeastern Wyoming there are also bur oak (*Quercus macroparpa*), elm (*Ulmus americana*), and green ash (*Fraxinus pennsylvanica*). In many places thickets of lower trees and shrubs occur, composed largely of silverberry (*Elaeagnus commutata*), buffaloberry (*Shepherdia argentea*), rose (*Rosa* spp.), sand-bar willow (*Salix exigua*), and rubber rabbitbrush (*Chrysothamnus nauseosus*). In many places in the introduced and weedy salt cedar (*Tamarix pentandra*) occurs in stream channels or along sandbars. In some places there are extensive marshy areas occupied by cattail

Typha latifolia) and various rushes (*Juncus* spp.) and sedges (*Cares* spp.). Numerous large reservoirs and a few natural lakes occur here containing beds of elodea (*Elodea canadensis*), pondweed (chiefly *Potamogeton pectinatus*), bullrush (*Sarpus* spp.), and rushes (*Juncus* spp.). The ground cover of the bottoms is largely grassland where there is sufficient moisture, but in drier areas the desert flora extend right up to the stream margins.

Common woody taxa are:

Acer negundo (boxelder)
Chrysothamnus nauseosus (rubber rabbitbrush, big rabbitbrush)
Elaeagnus commutata (silverberry)
Fraxinus pennsylvanica (green ash)
Populus sargentii (plains cottonwood)
Populus angustifolium
Quercus macroparpa (bur oak)
Rosa spp. (rose)
Salix amygdaloides (peach-leaved willow)
Salix exigua (sandbar willow)
Shepherdia argentea (buffaloberry)
Ulmus americana (elm)

(M) Grassland/Steppe

This is a broad belt of grassland extending from southeastern Wyoming, east of the Laramie Range, northward toward the Black Hills. These rolling hills and plains lying at an elevation between 4500 and 6000 feet, are covered with a rather uniform stand of relatively tall grasses and forbs, the belt constituting an extension westward of the Nebraska sandhills flora and that of the Great Plains. Characteristic here are several species of tall grasses, such as needlegrass (*Stipa* spp.), little bluestem (*Andropogon scoparius*), big bluestem (*Andropogon gerardi*), and sand bluestem (*Andropogon hallii*). The andropogons are rather patchy in most upland areas and are located mostly on hillsides and/or in valleys. Characteristic also are patches of lower grasses such as buffalograss (*Buchloe dactyloides*) and blue grama (*Bouteloua gracilis*), together with other grasses of more general distribution. Soapweed (*Yucca glauca*) is often common on exposed, arid sites, along with prickly pear (*Opuntia polyacantha* and *O. fragilis*). Lupines (*Lupinus* spp.), purple loco (*Oxytropis lambertii*), and a white-flowered beardtongue (*Penstemon albidus*) are showy forbs, and in sandy soils there is abundance of scurfpea (*Psoralea tenuiflora*) and *Calamovifla longifolia*.

Common plants found here are:

Agropyron smithii (western wheatgrass)
Andropogon scoparius (little bluestem)
Andropogon gerardi (big bluestem)
Andropogon hallii (sand bluestem)
Buchloe dactyloides (buffalograss)
Cares spp. (sedges)
Koeleria macrantha

Poa sandbergii (sandberg bluegrass)
Stipa spp. (needlegrass)

(O) Shadscale/Greasewood

This zone has been called the Saltbush Zone by many authors. Shadscale vegetation has been considered an edaphic climax on somewhat saline valley soils. Shadscale does tolerate salt much better than does sagebrush, but apparently it thrives best where the salt content of the soil is relatively low (Kearney et al. 1914). Its presence in valley bottoms of western Nevada where the salt concentration is high is probably just as related to its adaptation to a low moisture requirement as it is a salt tolerance (Billings 1949). In the valley bottoms of western Utah, where the precipitation is higher than 7 inches, the predominance of shadscale may perhaps be explained by its tolerance to periodic drought.

The shadscale community has three principle regions of development, western Nevada (Lahontan Basin), western Utah (Bonneville Basin) and eastern Utah (Uinta Basin and canyonlands). This desert community is typically dominated by low, widely spaced, more or less spiny, grayish, small-leaved shrubs which cover only about 10% of the ground area.

Shrubby species comprising this community are:

Atriplex confertifolia (shadscale)
Allenrolfea occidentalis (pickleweed, iodine bush)
Artemisia filifolia (sand sage)
Artemisia spinescens (budsage)
Atriplex canescens (4 wing saltbush)
Atriplex nuttallii (saltbush)
Chrysothamnus viscidiflorus (rabbitbrush)
Ephedra nevadensis (Mormon tea)
Eurotia lanata (winterfat)
Grayia spinosa (hopsage)
Gutierrezia sarothrae (snakeweed)
Kochia americana (gray molly)
Lycium cooperi (wolfberry)
Sarcobatus baileyi (greasewood)
Tetradymia glabrata (Horsebrush)

Perennial grasses and forbs:

Hilaria jamesii (galleta grass)
Oryzopsis hymenoides (Indian ricegrass)
Sitanion hystrix (squirreltail grass)
Sporobolus airoides (alkali sacaton)
Stipa speciosa (desert needlegrass)
Cardaria draba (whitetop)
Eriogonum ovalifolium (wild buchwheat)
Machaeranthera glabriuscula var. *villosa* (aster)
Opuntia spp. (prickly pear cacti)

Sphaeralcea ambigua (desert globemallow)
Sphaeralcea graossulariaefolia (gooseberryleaf globemallow)

Annuals (maturing in spring when autumn precipitation has been sufficient):

Bromus tectrum (cheat grass)
Cryptantha circumscissa (cateye)
Distichlis spicata var. *stricta* (saltgrass)
Eriogonum spp. (wild buckwheat)
Festuca octoflora (sixweeks fescue)
Halogeton glomeratus (halogeton)
Iva nevadensis (mash-elder)
Lepidium perfoliatum (pepper-grass)
Oenothera spp. (evening-primrose)
Salsola kali (Russian thistle)

Where the salt concentration gets too high for greasewood, the iodine bush or pickleweed (*Allenrolfea*) or saltgrass (*Distichlis*) associations develop. These communities are commonly found forming the inner fringe of vegetation around the barren playas, or separating upland communities from salt marsh communities.

Another common community within the Shadscale Zone in southern Utah is the sand sage (*Artemisia filifolia*) community. It is common in sandy soils.

In Wyoming: In highly alkaline places, which are common here, are large communities dominated by greasewood (*Sarcobatus vermiculatus*) and sea blite (*Suaeda* spp.). Bud sage (*Artemisia spinescens*), shadscale (*Atriplex confertifolia*), and kochchia (*Kochia americana*) are common elements. Dry or intermittent stream courses are often marked by large clumps of basin wild ryegrass (*Elymus cinereus*).

Agropyron smithii (western wheatgrass)
Artemisia spinescens (budsage)
Artemisia pedatifida (birdfoot sage)
Atriplex spp. (saltbush)
Atriplex confertifolia (shadscale)
Atriplex nuttallii (nuttall saltbush)
Chrysothamnus spp. (rabbitbrush)
Chrysothamnus nauseosus (rubber rabbitbrush, big rabbitbrush)
Distichlis stricta (desert saltgrass)
Elymus spp. (ryegrass)
Oryzopsis hymenoides (Indian ricegrass)
Sarcobatus vermiculatus (greasewood)
Sitanion hystrix (bottlebrush squirreltail)
Sporobolus airoides (alkali sacaton, hairgrass dropseed)
Suaeda spp. (sea blite, seep weed)

(P/Q) Sagebrush Community - P (Big/Tall sagebrush) - Q (Little/Low Sagebrush)

This is the climatic climax of desert areas where the annual precipitation is usually greater than 7 inches. It occupies the broad valleys and lower foothills, forming a distinct zone.

Sagebrush communities extend to nearly 10,000 feet in many areas. Such high elevation communities are not the typical desert or desert-steppe communities.

Steep rocky slopes and areas with shallow soils are commonly dominated by low sagebrush (*Artemisia arbuscula* var. *arbuscula*) or black sagebrush (*Artemisia arbuscula* var. *nova*).

The tall sagebrush communities are best developed on deep, permeable, salt-free soils of well-drained valleys and bases of mountain ranges, especially on the alluvial fans. The aspect of the typical sagebrush community is fairly dense to open vegetation with relatively large (2-6 feet high) non-spiny shrubs, and with perennial and annual grasses and forbs. The ground cover of sagebrush is from 15 to 40 percent.

Some of the important shrubs in this zone are:

Artemisia pedatifida (birdfoot sage)
Artemisia frigida
Artemisia arbuscula (low sagebrush)
Artemisia tridentata (big sagebrush)
Chrysothamnus nauseosus (big rabbitbrush, rubber rabbitbrush)
Chrysothamnus viscidiflorus (rabbitbrush)
Eurotia lanata (winterfat)
Grayia spinosa (hopsage)
Leptodactylon pungens (prickly phlox, prickly gilia)
Purshia tridentata (bitterbrush, antelope brush)
Ribes velutinum (gooseberry)
Symphoricarpos spp. (snowberry)
Tetradymia spp. (horsebrush)

Perennial grasses and forbs:

<i>Agropyron spicatum</i> (bluebunch wheatgrass)	Often
<i>Poa sandbergii</i> (sandberg bluegrass)	co-dominants with
<i>Festuca idahoensis</i> (bluebunch fescue)	sagebrush
<i>Agropyron smithii</i> (western wheatgrass)	
<i>Agoseris</i> spp. (mountain dandelion, false dandelion)	
<i>Allium acuminatum</i> (wild onion, tapertip onion)	
<i>Aristida longiseta</i> (red 3 awn)	
<i>Astragalus</i> spp. (milkvetch)	
<i>Balsamorhiza sagittata</i> (arrowleaf balsamroot)	
<i>Calochortus nuttallii</i> (sego lily)	
<i>Castilleja chromosa</i> (Indian paintbrush)	
<i>Delphinium</i> spp. (larkspur)	

Elymus cinereus (wild rye)
Eriogonum spp. (wild buckwheat)
Koeleria cristata (junegrass)
Lomatium spp. (desert parsley, biscuit root)
Lupinus sericeus (silky lupine)
Oryzopsis hymenoides (Indian ricegrass)
Phlox hoodii (Hood's phlox)
Phlox longifolia (longleaf phlox)
Poa fendleriana (muttongrass)
Sporobolus airoides (alkali sacaton)
Stipa comata (needleandthread grass)
Wyethia amplexicaulis (mules-ears)

Annuals:

Collinsia parviflora (blue-eyed Mary)
Eriogonum spp. (wild buckwheat)
Festuca octiflora (six-week's fescue)
Mimulus spp. (monkey flower)
Phacelia adenophora (phacelia)

Weeds found in disturbed habitats throughout the sagebrush zone:

Amaranthus retroflexus (pigweed, redroot)
Apocynum cannabinum (Indian hemp, dogbane)
Bromus rubens (foxtail)
Bromus tectorum (cheatgrass, downy chess)
Chenopodium album (goosefoot)
Convolvulus arvensis (field bindweed)
Cuscuta spp. (dodder)
Descurainia sophia (tansy mustard, flixweed)
Helianthus annuus (sunflower)
Lactuca serriola (wild lettuce)
Lepidium perfoliatum (clasping peppergrass)
Mentzelia albicaulis (whitestem stickleaf, blazing star)
Polygonum aviculare (prostrate knotweed)
Salsola kali (Russian thistle)
Sisymbrium altissimum (Jim Hill mustard, tumbling hedge mustard)
Taraxacum officinale (common dandelion)
Verbascum thapsus (great mullein, flannel mullein)

Some of the bunchgrasses are abundant enough that the prevailing vegetation is a sagebrush-grass or sagebrush-steppe community. The reason sagebrush tends to dominate some areas and bunchgrass others may be differences in the climate. A significant factor may be the time of precipitation. If it comes mostly in the winter the climax may be sagebrush and if it comes mostly in the summer it may be sagebrush-grass.

(R) Barren

The barren community type is primarily intended for those areas where insufficient vegetation exists on-site to be able to assign it to any of the other community types. Barren areas are those in which vegetative cover is sparse or nonexistent and can typically be found in badlands (with dense clay or clayey soils), scree (with very shallow or no soil development), and cliffs, rock outcrops, and boulderfields (primarily areas of bare rock and rock rubble). Barren areas can be found in various topographic positions and elevations.

(S) Marsh/Swamp

Marshes, swamps, and bogs are classified as wetlands. These lands are where water-saturated soil is the dominant factor determining the types of plants living on the surface. Wetlands are distinguished from riparian areas by the lack of primary association with a natural watercourse. Marshy and swampy areas surrounding lakes or ponds are generally placed in this category. Marshes and swamps in Wyoming are generally less than 20 acres in size, lack active wave-formed or bedrock shoreline features, and have a water depth in the deepest part of the basin less than 2m at low water. Marshes and swamps have at least a 30 percent areal vegetation cover.

(T) Lake/Reservoir

The lake/reservoir code should be used for those locations where the immediate area is covered by water most of the year and where limited vegetation (or no vegetation) has developed. An example of a situation where this may occur would be where an archeological site is exposed on the lake bed after lake waters recede.

(U) Agricultural/Developed/Seedings

This category should be used for any area in which the vegetation has been altered and utilized on a continuing basis by direct human action. This would include cropland, cultivated fields, human habitations, urban/industrial development, and waste areas. Areas that have been abandoned and (at least partially) reclaimed by native vegetation would not generally fit in this category.

(V) Blackbrush Community

The blackbrush community is more or less transitional between the creosote bush and shadscale communities. Because it may occur in several zones we have here listed it separately.

Blackbrush grows on non-saline, often sandy soils, where the rainfall is usually below six inches. The community appears as dense

to open stands of evergreen shrubs, often interspaced with galleta grass (*Hilaria*). Its best development is in southeastern Utah at low altitudes along the Colorado and lower Green Rivers. In southern Nevada (Beatley 1969) this community lies altitudinally between the creosote bush and the sagebrush communities (commonly 4500 -5000 ft.) and latitudinally between the creosote bush (Mojave Desert) and shadscale (Great Basin) communities.

Species commonly associated are:

Coleogyne ramosissima (blackbrush)
Artemisia filifolia (sandsage)
Artemisia parryi
Artemisia tridentata (big sagebrush)
Atriplex confertifolia (shadscale)
Brickellia oblongifolia var. *linifolia* (bricklebush)
Dalea fremontii (prairie clover)
Encelia frutescens (encelia)
Ephedra spp. (Mormon tea)
Eriogonum fasciculatum var. *polifolium* (California buckwheat)
Gutierrezia microcephala (snakeweed)
Haplopappus linearifolius (narrowleaf goldenweed)
Hilaria jamesii (Galleta grass)
Opuntia ramosissima and other spp. (prickly pear cacti)
Yucca baccata var. *vespertina* (datil yucca)
Yucca brevifolia (Joshua tree)

(W) Mountain Brush

On the lower slopes of the mountains there is often a zone of shrubs and small trees. In some places, particularly in limestone areas, this consists mainly of mountain mahogany (*Cercocarpus montanus* in eastern Wyoming and *C. ledifolius* to the west), while big sagebrush (*Artemisia tridentata*) is a characteristic and often dominant element where there is good soil development and adequate moisture from snow accumulation in the winter. Juniper (*Juniperus scopulorum* in eastern Wyoming and *J. osteosperma* in central and western Wyoming) may occur as scattered small trees or shrubs along with the preceding species, but it often forms an extensive woodland. In valleys, along major streams, a streamside forest, or sometimes only scattered trees, of narrowleaf cottonwood (*Populus angustifolia*) may be found, as well as shrubs such as willows (*Salix* spp.), roses (*Rosa* spp.), and dogwood (*Cornus stolonifera*). A common, conspicuous, tall grass of these sites is wild ryegrass (*Elymus cinereus*).

Common taxa are:

Amelanchier spp. (serviceberry)
Artemisia tridentata (big sagebrush)
Cercocarpus ledifolius (curlleaf mountain mahogany)
Cercocarpus montanus (mountain mahogany)
Juniperus osteosperma (juniper)

Juniperus scopulorum (juniper)
Prunus virginiana (chokecherry)
Purshia tridentata (bitterbrush, antelope brush)
Symphoricarpos spp. (snowberry)

(X) Prairie

The extensive Laramie Plains and similar grasslands of the interior of Wyoming are of a somewhat different character than the eastern plains, being shortgrass plains. Dominant grasses here are blue grama (*Bouteloua gracilis*), several species of bluegrass (*Poa* spp.), junegrass (*Koeleria cristata*), needlegrass (*Stipa* spp.), and several species of wheatgrass. *

(Y) Creosote Bush Community (Warm desert shrub)

Larrea tridentata, the creosote bush, is the dominant shrub on the broad alluvial fans (bajadas) and flats of southern Nevada where some underground water is available.

Some of the associated shrubs are:

Larrea tridentata (creosote bush)
Acamptopappus shockleyi (goldenhead)
Ambrosia (Franseria) dumosa (bur sage)
Atriplex confertifolia (saltbush)
Dalea fremontii (indigo bush)
Encelia farinosa (encelia)
Eurotia lanata (winterfat)
Grayia spinosa (hopsage)
Krameria parvifolia (ratany)
Lycium andersonii (Anderson wolfberry)
Lycium sockleyi (wolfberry)
Opuntia spp. (prickly pear cacti)
Yucca shidigera

Found in Upper limits of Creosote Bush Zone:

Yucca brevifolia (Joshua tree)
Coleogyne ramosissima (blackbrush)

Of six different *Larrea* communities the most common one in the high Mojave Desert (Lower Sonoran) is the *Larrea-Lycium-Grayia* (creosote bush-wolfberry-hopsage) association. In other parts of the Mojave Desert the typical association is *Larrea-Ambrosia* (creosote bush-bur sage). The general appearance is a mixture of somewhat evenly spaced medium tall and dwarf shrubs. Higher on the alluvial fans, toward the upper limits of the Zone, *Yucca brevifolia* (Joshua tree) forms open groves. This association extends up into the Shadscale and Sagebrush zones. Also coming in at these upper limits of the Creosote Bush Zone is *Coleogyne ramosissima* (blackbrush).