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Forest and Woodland Habitat Types (Plant Associations) of Northern New Mexico and Northern Arizona

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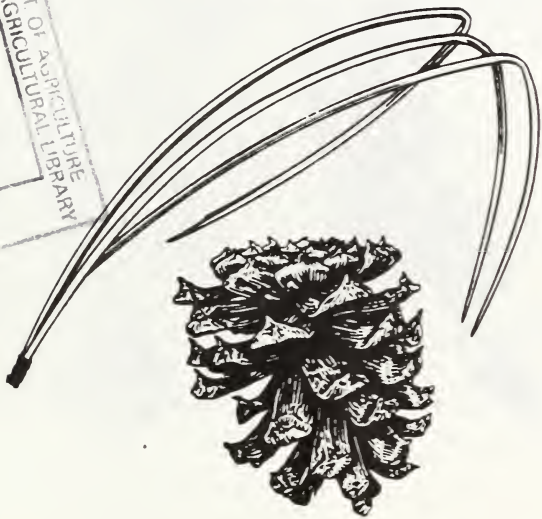


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**Forest and Woodland
Habitat Types
(Plant Associations)
of Northern New Mexico
and Northern Arizona**

Edition 2

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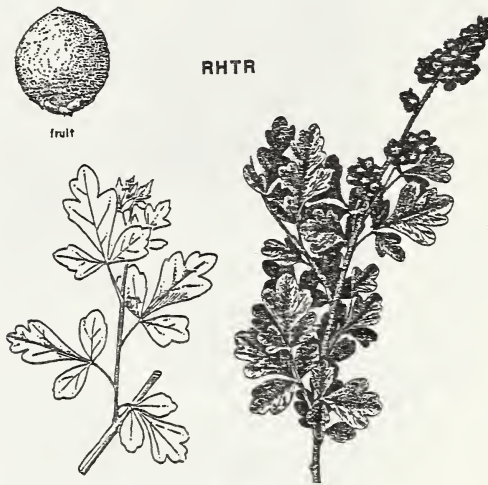
**USDA Forest Service
Southwestern Region
517 Gold Avenue, SW
Albuquerque, NM 87102**

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This material was prepared by Milo Larson and W. H. Moir from habitat type training courses conducted during the summers of 1985 to 1987. The botany section was furnished by Reggie Fletcher.

GEOGRAPHIC NOTE

The area covered by this guide includes New Mexico and Arizona north of interstate highway I-40. For habitat types south of I-40, see USDA Forest Service (1986b).



Rhus trilobata (skunkbush sumac)

416398

Using the Key and Descriptions

The key works best in stands from late successional to near climax stages. Stands in early to mid-seral stages generally will not key directly to their association. In young or recently disturbed stands the association must be inferred from site factors, indicator species, tree successional relationships, or from known successional stages. Fortunately, climax can usually be inferred from the most shade tolerant tree species that is successfully reproducing. The difficulty of young or mid-seral stands can also be minimized by finding the most mature stand on a similar site in the local landscape and applying the key to that stand.

To use the key, determine the combination of potential climax tree species by noting especially the proportions of trees in young, regenerating sizes. This helps identify the climax series, using the first of the keys below. The following keys A-G are based on forest and woodland series. In these keys it is necessary to identify certain understory shrubs and herbs (key species) and to note their canopy coverage. Coverage classes are defined by the adjectives and nouns below.

Proceed through the key making careful observations required at each decision couplet. For difficult decisions go both ways. Validate the determination against the description which fits your observations best. Check your observations if descriptions do not agree. No stand will fit the description perfectly.

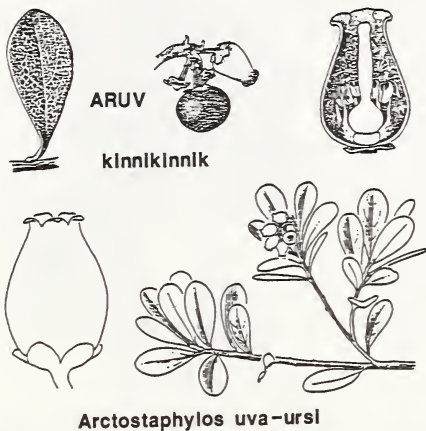
KEY ADJECTIVES AND NOUNS

- ABSENT - cannot be found in stand (opp = present)
- ACCIDENTAL - individuals very infrequent, occasional, or limited to special microsites.
- ABUNDANT - canopy coverage > 25%.
- COMMON - canopy coverage > 1% (opp = scarce).
- DOMINANT - Density or cover is as great as, or greater than, any other species of the same life form (two or more species can be dominant, i.e. codominant).
- LUXURIANT - canopy coverage > 50%.
- POORLY REPRESENTED - canopy coverage < 5% (opp = well represented).
- PRESENT - individuals can be found in the stand (opp = absent).
- REGENERATION - understory trees as established seedlings, saplings, or small poles (dbh < 10 in.).
- SCARCE - canopy coverage < 1% (opp = common).
- WELL REPRESENTED - canopy coverage > 5% (opp = poorly represented).

Key to Forests and Woodlands

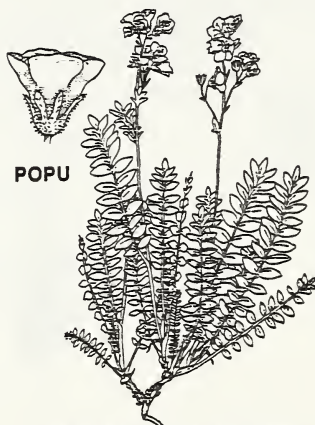
1. Dominant trees at climax are Pinus aristata (bristlecone pine),
Pinus edulis (pinyon pine), or Juniperus (Junipers)-----KEY G
1. Dominant trees at climax are not the above species
or include other trees as well...2
2. Forests of streamsidess with riparian obligate plants, such as
Populus angustifolia (narrow-leaf cottonwood), Alnus tenuifolia
(thinleaf alder), or Salix bebbiana (Bebb willow)-----RIPARIAN FORESTS (48)
2. Forests of other environments without riparian obligate plants...3
3. Forests of talus or debris slopes with fragmental soils
(gravels and cobbles are more than 90% soil volume)-----SCREE FORESTS (47)
3. Forests of other environments...4
4. Pinus flexilis (limber pine) is a climax tree...13
4. Pinus flexilis is seral or absent...5
5. Picea engelmannii (Engelmann spruce) is dominant or reproducing
successfully, clearly not accidental...6
5. Picea engelmannii absent, or accidental...8
6. Abies lasiocarpa (corkbark or subalpine fir) and Picea pungens
(blue spruce) both absent or scarce-----KEY A
6. Abies lasiocarpa or Picea pungens common...7
7. Picea pungens (blue spruce) absent or scarce-----KEY B
7. Picea pungens common-----KEY C
8. Abies lasiocarpa (corkbark or subalpine fir) common-----KEY B
8. Abies lasiocarpa absent or accidental...9
9. Picea pungens (blue spruce) reproducing successfully,
clearly not accidental-----KEY C
9. Picea pungens absent or accidental...10
10. Abies concolor (white fir) reproducing successfully,
clearly not accidental-----KEY D
10. Abies concolor absent or accidental...11
11. Pseudotsuga menziesii (Douglas-fir) reproducing successfully,
clearly not accidental...12
11. Pseudotsuga menziesii absent or accidental-----KEY F

12. Pinus ponderosa (ponderosa pine) is seral or absent,
clearly not a major climax dominant-----KEY E
12. Pinus ponderosa is a major climax dominant-----KEY F
13. Arctostaphylos uva-ursi (kinnikinnik) well represented-----PIFL/ARUV (20)
13. Arctostaphylos uva-ursi poorly represented or absent...14
14. Festuca arizonica (Arizona fescue) common-----PSME/FEAR,
PIFL phase (33)
14. Festuca arizonica absent or scarce-----PSME/MUMO
PIFL phase (34)



Key A - *Picea engelmanni* (Engelmann Spruce) Series

1. Herbs and shrubs scarce-----PIEN/MOSS (3)
1. Herbs or shrubs at least common...2
2. Saturated soils-----ABLA/MECI (10)
2. Soils otherwise...3
3. Understory essentially shrubby...6
3. Understory essentially herbaceous...4
4. Forests near timberline with plants of tundra affinity, such as
Geum rossii (alpine avens), common...5
4. Forest of lower elevations often with luxuriant herb cover----PIEN/EREX (1)
5. Vaccinium species (huckleberry, grouse wortleberry) present---PIEN/VAMY/POPU (5)
5. Vaccinium absent; San Francisco Peaks, AZ-----PIEN/GERO (2)
6. Vaccinium species (huckleberry, grouse wortleberry) present...7
6. Vaccinium absent...8
7. Polemonium pulcherrimum (Jacob's ladder) common-----PIEN/VAMY/POPU (5)
7. Polemonium pulcherrimum scarce or absent-----PIEN/VAMY (4)
8. Arctostaphylos uva-ursi (Kinnikinnik) common-----PIFL/ARUV (20)
8. Arctostaphylos uva-ursi absent-----PIEN/RIMO (6)

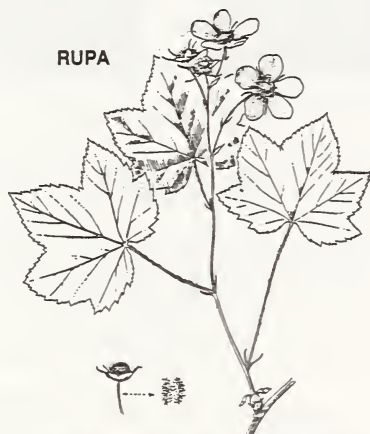


POPU

Polemonium pulcherrimum
(skunkleaf Jacob's ladder)

Key B - *Abies lasiocarpa* (corkbark fir, subalpine fir) Series

1. Herbs and shrubs scarce-----ABLA/MOSS (11)
1. Herbs or shrubs at least common...2
2. Saturated soils-----ABLA/MECI (10)
2. Soils otherwise...3
3. *Picea pungens* (blue spruce) common, reproducing well even
in mid to late succession...8
3. *Picea pungens* absent or accidental...4
4. Herbs luxuriant...5
4. Herbs common to abundant...6
5. *Erigeron eximius* (forest fleabane) scarce; *Lathyrus arizonicus*
(Arizona peavine) usually well represented-----ABLA/LAAR (9)
5. *Erigeron eximius* usually common-----ABLA/EREX (7)
6. *Vaccinium myrtillus* (myrtle leaf huckleberry) well represented--ABLA/VAMY (13)
6. *Vaccinium myrtillus* absent or poorly represented...7
7. *Rubus parviflorus* (thimbleberry) scarce, *Juniperus communis*
(common or ground juniper) common-----ABLA/JUCO (8)
7. *Rubus parviflorus* at least common-----ABLA/RUPA (12)
8. *Linnaea borealis* (twinline) well represented-----PIPU/LIBO (19)
8. *Linnaea borealis* absent or scarce-----PIPU/EREX (17)

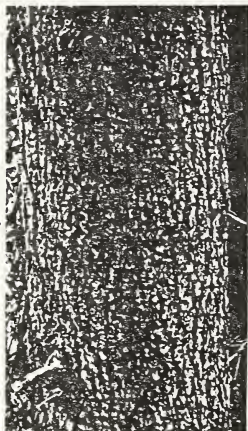


***Rubus parviflorus* (thimbleberry)**

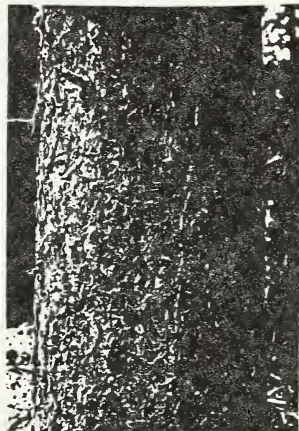
Key C - *Picea pungens* (blue spruce) Series

1. Forests of streamsid es or streamside terraces with riparian obligate shrubs, such as Alnus (alder) Salix bebbiana (Bebb willow), or Cornus stolonifera (red ozier dogwood)---PIPU/COST (16)
1. Forests without riparian obligate shrubs...2
2. Pinus ponderosa (ponderosa pine) is a common seral tree (often persisting in late succession)...3
2. Pinus ponderosa absent or accidental, even in early succession...6
3. Understory bunchgrasses, such as Festuca arizonica (Arizona fescue) well represented-----PIPU/FEAR (18)
3. Understory shrubby or herbaceous, but bunchgrasses poorly represented...4
4. Arctostaphylos uva-ursi (Kinnikinnik) well represented-----PIPU/ARUV (14)
4. Arctostaphylos uva-ursi poorly represented...5
5. Grasses and sedges (graminoids) abundant-----PIPU/CAFO (15)
5. Forbs abundant; graminoids common or well represented in small patches-----PIPU/EREX,PIPO phase (17)
6. Linnaea borealis well represented-----PIPU/LIBO (19)
6. Linnaea borealis absent or poorly represented-----PIPU/EREX (17)

Bark of mature spruces



Blue spruce



Engelmann spruce

Key D - *Abies concolor* (white fir) Series

1. Herbs and shrubs scarce (except sometimes Juniperis communis,
ground juniper)-----ABCO/BERE (23)
1. Herbs or shrubs at least common...2
2. Herbaceous cover luxuriant...3 (see also 8)
2. Herbaceous cover common to abundant...5
3. Erigeron eximius (forest fleabane) usually well represented-----ABCO/EREX (24)
3. Erigeron eximius absent to poorly represented...4
4. Lathyrus arizonica (Arizona peavine) well represented-----ABCO/LAAR (26)
4. Carex foenea (foeny sedge) or other herbs well represented-----ABCO/RONE (28)
5. Quercus gambelii (Gambel oak) well represented-----ABCO/QUGA (27)
5. Quercus gambelii poorly represented...6
6. Vaccinium myrtillus (myrtleleaf huckleberry) well represented-----ABCO/VAMY (30)
6. Vaccinium myrtillus absent or poorly represented...7
7. Arctostaphylos uva-ursi (kinnikinnik) well represented-----ABCO/ARUV (22)
7. Arctostaphylos uva-ursi poorly represented...8
8. Bunchgrasses (Festuca arizonica, Arizona fescue, Danthonia parryi
Parry oatgrass; Muhlenbergia montana, mountain muhly)
well represented-----ABCO/FEAR (25)
8. Above bunchgrasses poorly represented...9
9. Robinia neomexicana (New Mexico locust) common, often well
represented in openings-----ABCO/RONE (28)
9. Robinia neomexicana uncommon...10
10. Acer glabrum (Rocky Mountain maple) or Salix scouleriana
(forest willow) common-----ABCO/ACGL (21)
10. Above species absent or scarce...11
11. Essentially shrubby understories (excluding Robinia neomexicana,
New Mexico locust)-----ABCO/SYOR (29)
11. Essentially herbaceous understories; shrubs
(except sometimes Robinia neomexicana or Berberis
repens Oregon grape) poorly represented...12
12. Lathyrus arizonica (Arizona peavine) well represented-----ABCO/LAAR (26)
12. Lathyrus arizonica poorly represented-----ABCO/RONE (28)

Key E - *Pseudotsuga menziesii* (Douglas-fir) Series

1. Herbs poorly represented-----PSME/BERE (31)
1. Herbs well represented...2
2. *Quercus gambelii* (Gambel oak) well represented-----PSME/QUGA (36)
2. Gambel oak poorly represented...3
3. Herbs luxuriant...4
3. Herbs not luxuriant...5
4. *Festuca arizonica* (Arizona fescue) common-----PSME/FEAR (33)
4. *Festuca arizonica* scarce or absent-----PSME/BRCI (32)
5. *Festuca arizonica* (Arizona fescue) or *Poa pratensis* (Kentucky bluegrass) common; shrubs poorly represented-----PSME/FEAR (33)
5. Above grasses scarce or shrubs well represented...6
6. *Pinus ponderosa* (ponderosa pine) absent or seral ... 8
6. *Pinus ponderosa* climax; *Pseudotsuga menziesii* is sometimes co-climax...7
7. *Cowania mexicana* (Cliffrose) well represented-----PIPO/COME (40)
7. *Cowania mexicana* scarce or absent-----PSME/MUMO (34)
8. *Populus tremuloides* (aspen) is a major seral tree-----ABCO/ACGL (21)
8. *Populus tremuloides* is absent or scarce even in young stands---PSME/PHMO (35)



***Salix scouleriana* (Forest willow)**

Key F - Pinus ponderosa (Ponderosa pine) Series

1. Very open forests on sand dunes, cinders, or rockland...10
1. Forests and environments otherwise...2
2. Understory essentially grassy, shrubs poorly represented...3
2. Shrubs well represented in understory...5
3. Festuca arizonica (Arizona fescue) common-----PIPO/FEAR (41)
3. Festuca arizonica scarce or absent...4
4. Bouteloua gracilis (blue grama) well represented-----PIPO/BOGR (39)
4. Bouteloua gracilis poorly represented...12
5. Oaks (Quercus spp.) well represented...6
5. Oaks absent or poorly represented...7
6. Quercus undulata (wavyleaf oak) well represented-----PIPO/QUUN (45)
6. Quercus undulata absent or poorly represented-----PIPO/QUGA (44)
7. Arctostaphylos uva-ursi (kinnikinnik) well represented-----PIPO/ARUV (38)
7. Arctostaphylos uva-ursi absent...8
8. Cowania mexicana (cliffrose), Purshia tridentata, (bitterbrush),
or their hybrids well represented-----PIPO/COME (40)
8. Above shrubs absent or poorly represented...9
9. Artemisia arbuscula (low sagebrush) well represented-----PIPO/ARARN (37)
9. Artemisia tridentata (big sagebrush) well represented-----PIPO/BOGR (39)
10. Rockland (soils < 4 in. deep over most of area)-----PIPO/Rockland
(46)
10. Sandy or cindery soils...11
11. Sandy soils-----PIPO/ORHY (43)
11. Soils of volcanic cinder cones-----PIPO/BOGR,
ANHA phase (39)
12. Pseudotsuga menziesii (Douglas-fir) reproducing successfully,
not accidental-----PSME/MUMO (34)
12. Pseudotsuga menziesii absent or accidental-----PIPO/MUMO (42)

Key G - WOODLANDS: *Pinus aristata*, *Pinus edulis*, *Juniperus* Series (Bristlecone pine, Pinyon pine, Juniper Series)

1. Woodlands on slopes > 40% with rocky or bouldery soils and much rock outcrop or bare rock-----SCARP WOODLAND (1W)
1. Woodlands on slopes < 40% or soils not as above...2
2. *Pinus aristata* (bristlecone pine) present...31
2. *Pinus aristata* absent...3
3. Open woodlands dominated by *Juniperus* (*Pinus edulis* scarce or absent), mature trees mostly < 5m (16 ft.) tall...24
3. Open or closed woodlands with *Pinus edulis* common and climax or coclimax with *Juniperus*...4
4. *Arctostaphylos pungens* (manzanita) or *Coleogyne ramosissima* (blackbrush) well represented...23
4. Above shrubs scarce or absent...5
5. Oaks well represented...6
5. Oaks absent or poorly represented...7
6. *Quercus undulata* (wavyleaf oak) at least common-----PIED/QUUN (17W)
6. *Quercus undulata* absent or scarce-----PIED/QUGA (16W)
7. Open woodlands on rockland (soils < 4 inches deep)-----PIED/Rockland
7. Woodlands of other environments...8 (18W)
8. Understory essentially shrubby...9
8. Understory not shrubby...16
9. *Cercocarpus montana* (mountain mahogany) common or well represented-----PIED/CEMO (12W)
9. *Cercocarpus montana* not common or well represented...10
10. *Artemisia tridentata* (big sage) or *Purshia tridentata* (Bitterbrush) common or well represented...11
10. Both shrubs above scarce or absent...14
11. *Purshia tridentata* (bitterbrush) common-----PIED/PUTR (15W)
11. *Purshia tridentata* scarce or absent...12
12. *Cowania stansburiana* (cliffrose) common-----PIED/COME, ARTR phase (9W)
12. *Cowania stansburiana* scarce or absent...13
13. *Chrysothamnus nauseosus* (rabbitbrush) or *Fallugia paradoxa* (Apache plume) common along washes-----PIED/CHNA-FAPA (11W)
13. Above shrubs scarce or absent-----PIED/ARTR (7W)
14. Sandy soils; *Artemisia filifolia* (sand sage) or *Andropogon hallii* (sand bluestem) present to abundant-----PIED/ANHA (5W)
14. Soils otherwise; *Artemisia filifolia* or *Andropogon hallii* scarce or absent...15

15. Cowania mexicana (cliff rose) present to abundant-----PIED/COME (9W)
15. Chrysothamnus nauseosus (rabbitbrush) or Fallugia paradoxa
(Apache plume) common to abundant along streamsides,
washes, or deep cinder soils-----PIED/CHNA-FAPA (11W)
16. Understory scarce (mostly annuals)-----PIED/sparse (19W)
16. Understory essentially grassy; shrubs scarce
to well represented...17
17. Festuca arizonica (Arizona fescue) present-----PIED/FEAR (13W)
17. Festuca arizonica absent...18
18. Sandy soils; Andropogon hallii (sand bluestem) or Muhlenbergia
pungens (sandhill muhly) common to abundant-----PIED/ANHA (5W)
18. Soils otherwise; above grasses absent or scarce...19
19. Stipa columbiana, S. Schribner (Western or Schribner
needlegrass) common to well represented-----PIED/STCO3 (20W)
19. Above grasses scarce to poorly represented...20
20. Herbaceous cover < 5% with stony soils and often
steep slopes-----PIED/BOGR, hill-
slope phase (8W)
20. Herbaceous cover well represented...21
21. Poa fendleriana (mutton grass) common -----PIED/POFE (14W)
21. Poa fendleriana absent or scarce.....22
22. Juniperus osteosperma (Utah juniper) and
Bouteloua gracilis common-----PIED/BOGR, JUOS (8W)
22. Juniperus osteosperma scarce or absent-----PIED/BOGR, JUMO (8W)
23. Arctostaphylos pungens (manzanita) well represented-----PIED/ARPU (6W)
23. Coleogne ramisissima (blackbrush) well represented-----PIED/CORA (10W)
24. Deep sandy soils with Andropogon hallii (sand bluestem),
Muhlenbergia pungens (sandhill muhly),
or Dalea scoparia (sand indigobush)-----JUMO/ANHA (21W)
24. Soils and vegetation otherwise...25
25. Perennial herbs scarce-----JUOS-JUMO/
sparse (30W)
25. Perennial herbs common...26
26. Calcareous soils with Ceratoides lanata
(winterfat) well represented-----JUMO/CELA (26W)
26. Soil or vegetation otherwise...27
27. Sandy or gravelly washes or deep cinder deposits with
Chrysothamnus nauseosus (rabbitbrush) or Fallugia paradoxa
(Apache plume)----- JUMO/CHNA-FAPA
(27W)
27. Soils or dominant shrubs otherwise...28

28. Artemisia tridentata (big sagebrush) well represented...33
 28. Artemisia tridentata absent or poorly represented...29
29. Grassy savanna; oaks poorly represented...30
 29. Quercus undulata (wavyleaf oak) well represented,
 grasses scarce to abundant-----JUMO/QUUN (28W)
30. Juniperus monosperma (one seed juniper) dominant...34
 30. Juniperus osteosperma (Utah juniper) dominant-----JUOS/BOGR (25W)
31. Ribes (currents) common, grasses poorly represented-----PIAR/RIMO (4W)
 31. Ribes scarce, grasses well represented...32
32. Festuca thurberi (thurber fescue) common-----PIAR/FETH (3W)
 32. Festuca thurberi absent or scarce-----PIAR/FEAR (2W)
33. Juniperus osteosperma (Utah juniper) dominant-----JUOS/ARTR (29W)
 33. Juniperus monosperma (one seed juniper) dominant-----JUMO/ARTR (23W)
34. Bouteloua curtipendula (side oats grama) common; often
 colluvial soils of hillslopes-----JUMO/BOCU (24W)
 34. Bouteloua curtipendula scarce; often alluvial soils of valley
 plains or piedmont fans-----JUMO/BOGR (25W)



ARTR2



Artemisia tridentata (Big sage)

Format of the Descriptions

DESCRIPTIONS OF EACH PLANT ASSOCIATION (HABITAT TYPE) ARE ARRANGED IN THE FOLLOWING SEQUENCE:

- NAME** - BOTANIC, COMMON, AND CODE NAMES ARE GIVEN.
- CODE** - THIS IS A NUMBER FOR ASSOCIATIONS AND PHASES AS USED IN AUTOMATED TIMBER STAND FILES.
- SYN** - SYNONYMY, OR OTHER NAMES FOR THE ASSOCIATION OR HABITAT TYPE APPEARING IN PUBLISHED LITERATURE.
- SITE** - GENERAL ENVIRONMENTAL FEATURES OF THE PLANT ASSOCIATION; MAP = MEAN ANNUAL PRECIPITATION. THE RANGE OF SOILS IS GIVEN IN VARIOUS TES REPORTS.
- TES** - LIFE ZONES AND ELEVATIONAL SUBZONES ALONG A CLIMATIC GRADIENT FROM INFORMATION IN THE TERRESTRIAL ECOSYSTEM SURVEY (TES). CODING IS AS FOLLOWS:

<u>CODE</u>	<u>LIFEZONE</u>	<u>CODE</u>	<u>ELEVATIONAL SUBZONE</u>
4	Woodlands	-1	warm, dry
5	Ponderosa pine	0	typical or modal
6	Mixed conifer	+1	cool, wet
7	Subalpine forest		

CLIMATES ARE CODED AS FOLLOWS: HSC - HIGH SUN COLD, LSC - LOW SUN COLD, LSM - LOW SUN MILD. CONSULT TES HANDBOOK FOR DETAILED DESCRIPTIONS OF THESE CLIMATES. IF NO CLIMATIC CODE IS GIVEN, IT IS ASSUMED TO BE LSC.

- TREES** - TREES ARE CODED AS FOLLOWS: ABLA = Abies lasiocarpa, PIEN = Picea engelmannii, PIPU = Picea pungens, POTR = Populus tremuloides, POAN = Populus angustifolia, ABCO = Abies concolor, PSME = Pseudotsuga muenziesii, PIAR = Pinus aristata, PIFL = Pinus flexilis (= Pinus strobiformis), PIPO = Pinus ponderosa, QUCA = Quercus gambelii, PIED = Pinus edulis, JUSC = Juniperus scopulorum, JUDE = Juniperus deppeana, JUMO = Juniperus monosperma, JUOS = Juniperus osteosperma.

Note: Pinus flexilis and P. strobiformis can be indistinguishable over portions of this area.

TREE SUCCESSIONAL STATUS IS GIVEN AS FOLLOWS:

<u>CODE</u>	<u>STATUS</u>	<u>CONCEPT</u>
C	Major Climax	Species is clearly regenerating successfully <u>and</u> surviving to maturity in late and advanced stages of succession. The species is also present in all (or nearly all stands).
c	Minor Climax	As above except species may not occur in all (or most) stands.
S	Major Seral	Species is clearly regenerating successfully <u>and</u> surviving only in early or middle stages of succession, although mature trees often persist as overstory in later stages. The species is present or potential in all (or nearly all) stands.
s	Minor Seral	As above except species may not occur (now or as potential) in all (or most) stands.
a	Accidental	The species occurs (either as seral or climax associate) only on special microsites or very infrequently. It will not become more abundant as succession progresses.
	Blank	Species is not found in typical stands.

SHRUBS, HERBS, CRYPTOGAMS.

CRYPTOGAMS ARE USUALLY THE MOSSES AND LICHENS CONSIDERED COLLECTIVELY. AN EXPRESSION OF COVERAGE IS FOLLOWED BY LISTING SOME OF THE MORE FREQUENTLY ENCOUNTERED PLANTS. COVERAGE VALUES ARE AS FOLLOWS:

Luxuriant = coverage > 50%, Abundant = 25-50%, Well represented = 5-25%, Poorly represented = < 5%, Common = 1-5%, Scarce = < 1%.

Percentages are relative to the entire area of a plot or stand.

Diagnostic species are indicated by #.

DIS - DISTRIBUTION OR GEOGRAPHIC RANGE. STATE ABBREVIATIONS ARE: AZ = ARIZONA, NM = NEW MEXICO, CO = COLORADO, UT = UTAH, ID = IDAHO. LOCATIONAL ADJECTIVES INCLUDE s = SOUTHERN, c = CENTRAL, n = NORTHERN, sw = SOUTHWESTERN, ETC. ADMINISTRATIVE ABBREVIATIONS INCLUDE NF = NATIONAL FOREST, RD = RANGER DISTRICT, RES = INDIAN RESERVATION.

ALSO SEE - REFERENCE IS GIVEN TO SIMILAR OR CLOSELY RELATED ASSOCIATIONS.

Format of the Management Implications

H. T. - COMMON NAME OF THE HABITAT TYPE

REGENERATION METHODS - THE GENERAL RECOMMENDATIONS MAY BE MODIFIED BY CONDITIONS OF SOIL OR TOPOGRAPHY.

PLANTING - THE PROBABILITY OF PLANTING SUCCESS IS A SUBJECTIVE ESTIMATE OF PROBABILITY OF ACHIEVING 80% OR HIGHER SURVIVAL OF WELL-PLANTED, HEALTHY SEEDLINGS ON ADEQUATELY PREPARED SITE. FOR SOIL LIMITATIONS TO PLANTING, SEE TES REPORTS.

SITE PREPARATION CODES ARE:

B = USUALLY BENEFICIAL FOR PLANTED CONIFERS,
H = USUALLY DETRIMENTAL TO CHANCES FOR SURVIVAL OF PLANTED OR
NATURALLY SEEDED CONIFERS,
A = STRONGLY FAVORS NATURAL REGENERATION OF ASPEN.

FOR SOIL LIMITATIONS ON SITE PREPARATION, SEE TES REPORTS.

REVEGETATION IS A SUBJECTIVE ESTIMATE OF RATE OF REVEGETATION AFTER CLEARING OR CATASTROPHIC DISTURBANCE. FOR EROSION OR SOIL LOSS INDICES, SEE TES REPORTS. SOIL SPECIFIC REFORESTATION POTENTIALS ARE ALSO GIVEN IN TES REPORTS.

STOCKABILITY IS AN ESTIMATE OF THE ABILITY OF THE HABITAT TYPE TO SUPPORT FULL STOCKING OF COMMERCIAL TIMBER SPECIES EXPRESSED AS A DECIMAL FRACTION.

BUDWORM SUSCEPTABILITY IS AN INDEX VALUE FOR USE IN THE WESTERN SPRUCE BUDWORM HAZARD RATING FORMULA.

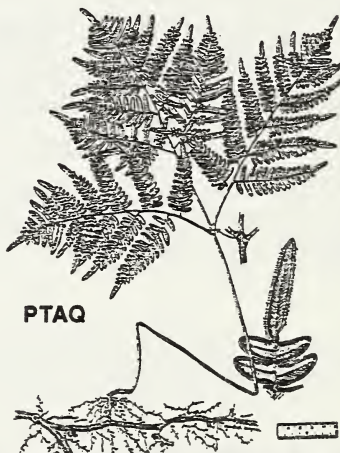
TSI - TIMBER STAND IMPROVEMENT

PRODUCTIVITY TREES ARE ESTIMATED FROM LIMITED SITE INDEX DATA AND CLASSIFIED BY CUBIC FEET/ACRE/YEAR AS HIGH, MODERATE, AND LOW. SITE INDEX IS AN AVERAGE FOR THE SPECIES NOTED PLUS OR MINUS ONE STANDARD DEVIATION. N = NUMBER OF SITE TREES INCLUDED IN THE INDEX. FOR SITE INDEX BY SOIL TYPES, SEE TES REPORTS. MORE DATA IS NEEDED FOR MOST HABITAT TYPES.

FORAGE RATING VALUE FOR CATTLE ARE GIVEN FOR CLEARINGS (EARLY SERAL) AND FOR MATURE FOREST STANDS (LATE SERAL). FOR FORESTS THE RATINGS ARE:

HIGH	> 1500 lbs/acre/yr (average)
MODERATE	500-1500 lbs/ac./yr
LOW	250-500 lbs/ac./yr
NONE	< 250 lbs/ac./yr

FORAGE AND FORAGE MAXIMUM RATINGS FOR SPECIFIC SOILS ARE CONTAINED IN TES REPORTS.



Pteridium aquilinum (bracken fern)

FORESTS



White fir/Kinnikinnik h.t.

ORPA



Oreochrysum parryi (Parry's goldenweed)

THFE



Thalictrum fendleri (Meadow rue)



ACGL



Acer glabrum (Rocky Mountain maple)

Picea engelmannii/Erigeron eximius

1

Engelman spruce/Forest fleabane
PIEN/EREX

004310

SYN: Picea pungens-P. engelmannii/Erigeron superbus (Moir and Ludwig 1979).

SITE: Gentle to steep slopes, 8,800-10,000 ft.

TES: 7, -1.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	Q
B	I	I	O	B	S	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	G
A	N	U	R	O	E	L	R	O	D	C	O	A
a	C	s	S	s	S	s		s				

SHRUBS: Poorly represented. Acer glabrum, Physocarpus monogynus, Rubus parviflorus.

HERBS: Abundant to luxuriant. Bromus ciliatus, Carex foenea, Trisetum montanum, Erigeron eximius, Geranium richardsonii, Lathyrus arizonicus, Thermopsis pinetorum, Viola canadensis.

DIS: C-AZ, sw- and c-NM into n-NM (Jemez Mts.)

ALSO SEE: ABLA/EREX if Abies lasiocarpa has common reproduction and is surviving. ABCO/EREX or ABCO/ACGL if Picea engelmannii is minor as regeneration relative to Abies concolor and Pseudotsuga menziesii in mature stands.

MGT: See ABLA/EREX.

COMMENTS:

Picea engelmannii/Geum rossii

Engelmann spruce/Alpine avens
PIEN/GERO

004330

SITE: 11,000 ft. to timberline; very limited growing season for trees. Upper elevational forest limit coincides with 12 degrees C June isotherm.

TES: 7, +1.

TREES:

A	P	P	P	A	P	P	P	P	P	P	J	J	Q
B	I	I	O	B	S	I	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	G	
A	N	U	R	O	E	L	R	O	D	C	O	A	
a	C						s						

SHRUBS: Scarce to common. *Ribes montigenum*, *Lonicera involucrata*.

HERBS: Well represented. *Geum rossii**, *Polemonium pulcherrimum*, *Trisetum spicatum*, *Aquilegia chrysantha*, *Festuca brachyphylla*, *Monesis uniflora*.

CRYPTOGAMS: Well represented especially lichens and minute mosses.

DIS: n-AZ (San Francisco Peaks).

ALSO SEE: *Picea engelmannii*/*Ribes montigenum* (Youngblood and Mauk 1985) if herbs are poorly represented. PIEN/GERO is distinct from krumholz where *Picea engelmannii* is shrubby because of tundra-like climate.

MGT: See PIEN/VAMY/POPU.

Picea engelmannii/Moss

3

Engelmann spruce/Moss
PIEN/Moss

004060

SITE: Summits, ridgetops, dry upper slopes > 10,000 ft.

TES: 7, -1.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	Q
B	I	I	O	B	S	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	G
A	N	U	R	O	E	L	R	O	D	C	O	A
	C		S		S	S						

SHRUBS: Scarce. *Acer glabrum*, *Lonicera involucrata*, *Vaccinium myrtillus*.

HERBS: Scarce (occasional species to 2-3 percent cover).

CRYPTOGAMS: Well represented on microsites without litter.

DIS: Cibola National Forest (Magdalena Ranger District)-San Mateo Mts. NM. Coronado National Forest (Douglas Ranger District), Chiricahua Mts., AZ, local in n-NM, CO, WY, ID.

ALSO SEE: PIEN/VAMY where *Vaccinium myrtillus* has cover > 5 percent; ABLA/Moss where *Abies lasiocarpa* is a major climax tree.

COMMENTS: The absence of *Abies lasiocarpa* at low elevations is partly due to chance factors of migration and establishment in a "mountain island" setting of the Basin and Range physiographic province.

H. T.: Engelmann spruce/Moss

REGENERATION METHODS:

Clearcut: Is not usually successful, can favor aspen to a limited extent on better sites.

Shelterwood: Is usually successful, favors spruce or sometimes Douglas-fir.

Seed Tree: Not usually successful.

Selection: Is usually successful, favors spruce.

PLANTING:

Recommended Species: Engelmann spruce, Douglas-fir (in San Mateos).

Success Probability: Moderate to poor in large openings.

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	H	B
Burning	H	H	H

REVEGETATION: Slow

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 0.6

TSI: Not usually needed.

PRODUCTIVITY:

Site Index (NO DATA) _____ Productivity Low

Resource Value Rating (Cattle): Early Seral None Late Seral None

OTHER: Cold, windswept sites of limited potential for timber and range. Large openings can be very difficult to reforest because of dry, exposed nature of the site.

Picea engelmannii/Vaccinium myrtillus

4

Engelmann spruce/Myrtle huckleberry
PIEN/VAMY

004360

SITE: Upper n- or e-facing slopes, > 10,000 ft.; northerly draws > 9,500 ft.; extremely cobbly soils.

TES: 7, -1.

TREES:

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
		C		S	s	S	S						

SHRUBS: Well represented to abundant. *Vaccinium myrtillus**, *Juniperus communis*, *Jamesia americana*, *Lonicera utahensis*, *Salix scouleriana*, *Acer glabrum*.

HERBS: Poorly represented. *Bromus ciliatus*, *Ramischia secunda*, *Erigeron eximius*.

CRYPTOGAMS: Well represented on microsites without litter.

DIS: Cibola National Forest (Magdalena Ranger District); San Mateo Mts.; local in Jemez Mts (Jemez RD)

ALSO SEE: PIEN/Moss; ABLA/VAMY, LIBO and RUPA phases.

COMMENTS:

H. T.: Engelmann spruce/Myrtle huckleberry

REGENERATION METHODS:

Clearcut: Is usually successful if kept small and planted promptly.
Favors aspen if any aspen is in the original stand.

Shelterwood: Is usually successful; heavy cuts sometimes cause blowdown
of the residual. Tends to favor Douglas-fir.

Seed Tree: Is not usually successful because of blowdown of the seed trees.

Selection: Is usually successful and favors spruce.

PLANTING:

Recommended Species: Engelmann spruce, Douglas-fir, Southwestern white pine.

Success Probability: High

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	B	B
Burning	H,A	H,A	

REVEGETATION: Moderately rapid.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 0.6

TSI: Sometimes is needed to reduce stocking.

PRODUCTIVITY:

Site Index (NO DATA) _____ Productivity L to M

Resource Value Rating (Cattle): Early Seral L Late Seral None

OTHER: Has good potential for water yield and aspen management. Browse
production is important for wildlife summer range; browse component
increases in seral stages.

Picea engelmannii/Vaccinium myrtillus/Polemonium pulcherrimum

Engelmann spruce/Myrtle huckleberry/Jacobs ladder
PIEN/VAMY/POPU

PIEN phase 004151
ABLA phase 004152

SYN: *Picea engelmannii*/*Vaccinium scoparium*/*Polemonium delicatum*
(Moir and Ludwig 1979).

SITE: 10,900 ft. to timberline. Upper limit (at timberline) coincides
with the 12 degrees C isotherm in June. Very limited growing
season for trees.

TES: 7, +1.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	Q
B	I	I	O	B	S	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	G
A	N	U	R	O	E	L	R	O	D	C	O	A
c	C						s					

SHRUBS: Well represented. *Vaccinium myrtillus*, *V. scoparium*, *Ribes*
montigenum, *Lonicera involucrata*.

HERBS: Well represented. *Polemonium delicatum**, *Senecio amplexans*,
Ramischia secunda, *Monesis uniflora*, *Sibbaldia procumbens*,
Penstemon whippleanus.

CRYPTOGAMS: Well represented, including both lichens and mosses.

DIS: N-NM, s-CO.

ALSO SEE: Krummholz refers to a forest-tundra border vegetation
characterized by stunted, shrubby stature of *Picea engelmannii*
and *Abies lasiocarpa*. See also *Picea engelmannii*/*Trifolium*
dasyphyllum in central CO (Hess and Alexander 1986).

COMMENTS:

H. T.: Engelmann spruce/Myrtle huckleberry-Jacobs ladder

REGENERATION METHODS:

Clearcut: Seldom, if ever successful, favors tundra plants.

Shelterwood: Usually successful if enough time is allowed for seedlings to become established.

Seed Tree: Not usually successful due to blowdown.

Selection: Usually successful.

PLANTING:

Recommended Species: Engelmann spruce.

Success Probability: Low

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	H	B
Burning	H	H	H

REVEGETATION: After disturbance, moderate to slow.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 0

TSI: Not usually needed.

PRODUCTIVITY: PIEN

Site Index 52 + 9 _____ Productivity L to M

Resource Value Rating (Cattle): Early Seral Low Late Seral None

OTHER: Can be very important for snow retention especially in ski areas. Very difficult to reforest once cleared or burned. Occupies the forest-alpine tundra ecotone.

Picea engelmannii/Ribes montigenum

6

Engelmann spruce/Mountain gooseberry
PIEN/RIMO

004340

SITE: 10,000 to 11,400 ft., on extremely rocky soils; MAP = 31 in/yr.,
mean annual air temperature 34 F (1.2 C).

TES: 7, +1.

TREES:

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
	a	C		s									

SHRUBS: Common. Ribes montigenum.

HERBS: Scarce. For list see PIEN/GERO.

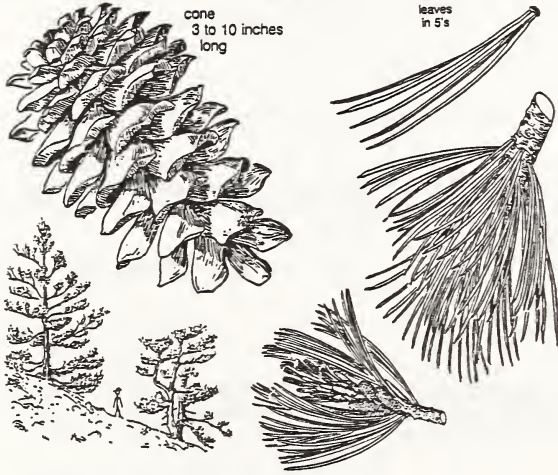
CRYPTOGAMS: Well represented especially lichens on rocks.

DIS: N-NM (San Francisco Peaks) into s-UT.

ALSO SEE: Scree forest; PIEN/GERO if herbs are well represented.

MGT: Soil and climatic limitations generally preclude silviculture.
Budworm SUSCEPTIBILITY 0. See Youngblood and Mauk (1985).

PIFL



***Pinus flexilis* (Lumber pine)**

Abies lasiocarpa/Erigeron eximius

7

Corkbark fir/Forest fleabane
ABLA/EREX

003080

SYN: *Abies lasiocarpa/Erigeron superbus* (Moir and Ludwig 1979), ABLA-PIEN1/EREX (Johnston 1984).

SITE: All slopes and aspects 9,400-10,200 ft.; n-slopes as low as 8,900 ft. MAP 29-31 in/yr.; deep winter snowpack.

TES: 7, -1.

TREES:

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
	C	C	s	S	s	S	s						

SHRUBS: Poorly or well represented. *Juniperus communis*, *Rubus parviflorus*, *Salix scouleriana*, *Acer glabrum*, *Lonicera involucrata*, *Shepherdia canadensis*.

HERBS: Luxuriant. *Erigeron eximius**, *Geranium richardsonii*, *Smilacina stellata*, *Osmorhiza depauperata*, *Artemisia franserioides*, *Ramischia secunda*, *Viola canadensis*, *Bromus ciliatus*, *Trisetum montanum*, *Carex foenea*.

CRYPTOGAMS: Well represented.

DIS: c-AZ, sw-NM into s-CO.

ALSO SEE: ABLA/LAAR, PIEN/EREX, and ABLA/ACGL (Alexander *et al* 1987, Youngblood and Mauk 1985), the latter on sites with shrubs well represented.

COMMENTS:

H. T.: Corkbark fir/Forest fleabane

REGENERATION METHODS:

Clearcut: Favors aspen; favors spruce over fir.

Shelterwood: Heavy shelter favors fir, less shelter favors spruce.

Seed Tree: Not usually successful due to blowdown.

Selection: Favors fir over spruce and aspen.

PLANTING:

Recommended Species: Engelmann spruce, Douglas-fir, corkbark fir.

Success Probability: High

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	B	B
Burning	H,A	H,A	

REVEGETATION: Rapid

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 1.5

TSI: Can be used to improve species composition.

PRODUCTIVITY: 20 / 100

$$\text{Site Index} \quad \frac{82 + ?}{\text{PSME}} \quad \frac{64 + 16}{\text{PIEN}} \quad \text{N} = \underline{89}$$

Resource Value Rating (Cattle): Early Seral H Late Seral M-L

OTHER: Good potential for aspen management; important for snow retention.

Abies lasiocarpa/Juniperus communis

8

Subalpine fir/Common juniper
ABLA/JUCO

003090

SYN: *Abies asiocarpa*-*Picea engelmannii*/*Juniperus communis*
(Johnston 1984).

SITE: N- or e-facing draws and gentle to moderate slopes, 8,700-9,200 ft.
MAP 29 in./yr.; moderate snowpack, little precipitation in May and June.

TES: 7, -1.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	Q
B	I	I	O	B	S	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	G
A	N	U	R	O	E	L	R	O	D	C	O	A
	C	C		S	s	S			a			

SHRUBS: Common. *Juniperus communis*, *Berberis repens*, *Robinia neomexicana*,
Lonicera utahensis.

HERBS: Usually common. *Carex foenea*, *C. rossii*, *Fragaria ovalis*,
Ramischia secunda, *Erigeron eximius*, *Bromus ciliatus*.

DIS: N-AZ (North Kaibab Plateau) into UT, ID, WY; perhaps local in n-NM.

ALSO SEE: Youngblood and Mauk (1985) describe ABLA/JUCO in s- and c-UT;
ABLA/MOSS.

COMMENTS:

H. T.: Subalpine fir/Common juniper

REGENERATION METHODS:

Clearcut: Often successful if small. Larger openings, usually need prompt planting.

Shelterwood: Usually successful.

Seed Tree: Not usually successful due to blowdown.

Selection: Usually successful, favors fir over spruce.

PLANTING:

Recommended Species: Engelmann spruce, Douglas-fir.

Success Probability: Moderate to low due to cold, dry conditions.

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	B	B
Burning	H	H	H

REVEGETATION:

STOCKABILITY: 1.0

BUDWORM SUSCEPTIBILITY: 1.5

TSI: Occasionally needed.

PRODUCTIVITY:

Site Index ? Productivity L to M

Resource Value Rating (Cattle): Early Seral Moderate Late Seral None

OTHER: Common juniper can provide good cover for ground nesting birds.

Abies lasiocarpa/Lathyrus arizonicus

9

Corkbark fir/Arizona peavine
ABLA/LAAR

001070

SITE: 9,400-10,000 ft., elevation on deep, well-watered soils; moderate snowpack.

TES: 7, 0.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	Q
B	I	I	O	B	S	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	G
A	N	U	R	O	E	L	R	O	D	C	O	A
C	C		S									

SHRUBS: Scarce.

HERBS: Luxuriant. *Lathyrus arizonicus*, *L. leucanthus*, *Vicia americana*, *Oreochrysum parryi*, *Pteridium aquilinum*, *Smilacina stellata*, *Geranium richardsonii*, *Carex foenea*, *Carex geveryi*, *Bromus ciliatus*.

DIS: N-AZ and n-NM, local in sw-NM.

ALSO SEE: *Abies lasiocarpa*/*Carex geveryi* in CO and UT (Youngblood and Mauk 1985; Rominger and Paulik (1983) for description in San Francisco Peaks, AZ. This h.t. is closely related to ABLA/EREX.

COMMENTS:

H. T.: Subalpine fir/Arizona peavine

REGENERATION METHODS:

Clearcut: Usually successful, favors aspen strongly.

Shelterwood: Usually successful, favors spruce and fir.

Seed Tree: Not usually successful.

Selection: Usually successful, favors fir over other species.

PLANTING:

Recommended Species: Engelmann spruce.

Success Probability: High

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	B	B
Burning	A	A	A

REVEGETATION:

STOCKABILITY: 1.0

BUDWORM SUSCEPTIBILITY: .8

TSI: Sometimes needed.

PRODUCTIVITY:

Site Index ___?___ _____ _____ Productivity High _____

Resource Value Rating (Cattle): Early Seral High Late Seral Low

OTHER: Important for water yield and summer range for big game; tall aspen can have scenic value.

Abies lasiocarpa/Mertensia ciliata

10

Subalpine fir/bluebells
ABLA/MECI

003060

SYN: *Abies lasiocarpa*-*Picea engelmannii*/*Mertensia ciliata*
(Johnston 1984).

SITE: Moderate to steep slopes, 10,000 ft. to timberline; seeps and saturated soils.

TES: 7, 0, +1.

TREES:

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
	C	C											

SHRUBS: Absent except on hummocks where Vaccinium or Ribes can occur.

HERBS: Luxuriant. *Mertensia ciliata*, *Oxypolis fendleri*, *Cardamine cordifolia*, *Caltha leptosepala*, *Saxifraga odontoloma*, *Senecio triangularis*.

DIS: n-NM into CO.

ALSO SEE:

COMMENTS: Stands near timberline may have little Abies lasiocarpa.

H.T.: Subalpine fir/bluebells

REGENERATION METHODS:

Clearcut: Favors herbs.

Shelterwood: Sometimes successful, heavy cuts often blowdown.

Seed Tree: Not recommended due to blowdown.

Selection: Usually successful if cutting is light.

PLANTING:

Recommended Species: Engelmann spruce.

Success Probability: Low

SITE PREPARATION:

INTENSITY:

<u>METHOD</u>	<u>HIGH</u>	<u>MODERATE</u>	<u>LOW</u>
Mechanical	H	H	
Burning	N/A	N/A	N/A

REVEGETATION: After disturbance, rapid due to lush regrowth of sedges, grasses and tall forbs.

STOCKABILITY: 1

BUDWOARM SUSCEPTIBILITY: 0.6

TSI: Not usually needed.

PRODUCTIVITY: PIEN

Site Index 62 + 14 _____ Productivity Moderate

Forage Value Rating (Cattle): Early Seral High Late Seral None

OTHER: Very wet; operation of heavy equipment is impossible or very damaging to site. If tree removal is necessary cable yarding should be used. Very difficult to regenerate once cleared or burned. Important for elk wallows, natural water sources.

Abies lasiocarpa/Moss

11

Corkbark (subalpine) fir/Moss
ABLA/MOSS

003110

SYN: *Abies lasiocarpa*-*Picea engelmannii*/Moss (Johnston 1984).

SITE: Summits, ridgetops, upper slopes 9,800-11,500 ft.; cold, dry sites.

TES: 7, 0.

TREES:

A	P	P	P	A	P	P	P	P	P	P	J	J	Q
B	I	I	O	B	S	I	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	M	G
A	N	U	R	O	E	L	R	O	D	C	O	O	A
C	C		s		s		s						

SHRUBS: Scarce to common. *Juniperus communis*, *Ribes montigenum*, *Vaccinium* spp., *Acer glabrum* (lower elevations).

HERBS: Scarce.

CRYPTOGAMS: Well represented on microsites without litter.

DIS: NM, AZ, s-CO.

ALSO SEE: At lower elevations ABLA/JUCO has common herbs, and *Pseudotsuga* is a more important seral tree. At higher elevations or more exposed sites where *Abies lasiocarpa* becomes a minor tree, see PIEN/MOSS.

COMMENTS:

H.T.: Subalpine fir/moss

REGENERATION METHODS:

Clearcut: May favor aspen if present, otherwise not usually successful unless promptly planted.

Shelterwood: Usually successful, favors Engelmann spruce.

Seed Tree: Not usually successful.

Selection: Favors subalpine fir.

PLANTING:

Recommended Species: Engelmann spruce.

Success Probability: Moderate

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	H	B
Burning	H	H	

REVEGETATION: After disturbance moderate.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 0

TSI:

PRODUCTIVITY: PIEN

Site Index 54 + 11 _____ Productivity Low to moderate

Forage Value Rating (Cattle): Early Seral Moderate Late Seral None

OTHER: Dry habitat type occurs typically near ridges and upper slopes. Poor site for aspen.

Ables lasiocarpa/Rubus parviflorus

12

Corkbark fir/Thimbleberry
ABLA/RUPA

003240

SYN: ABLA-PIEN1/RUPA (Johnston 1984).

SITE: Mid and lower slopes and draws 8,800-9,200 ft. (but as low as 8,200 ft. in sheltered draws). Soils often extremely cobbly.

TES: 7, -1.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	Q
B	I	I	O	B	S	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	G
A	N	U	R	O	E	L	R	O	D	C	O	A
C	c		S	s	S	a						

SHRUBS: Abundant. *Acer glabrum*, *Rubus parviflorus**, *Holodiscus dumosus*, *Salix scouleriana*, *Robinia neomexicana*, *Lonicera utahensis*.

HERBS: Well represented (sometimes abundant). *Geranium richardsonii*, *Bromus ciliatus*, *Pteridium aquilinum*, *Smilacina racemosa*, *Senecio cardamine*, *Osmorhiza depauperata*, *Actaea rubra*, *Ramischia secunda*.

DIS: Gila NF (Wilderness RD) - local in Mogollon Mts., NM; also n-NM, s-CO (DeVelice et al 1986).

ALSO SEE: ABLA/ACGL (Alexander et al 1987, Youngblood and Mauk 1985).

COMMENTS:

H. T.: Corkbark fir/Thimbleberry

REGENERATION METHODS:

Clearcut: Favors spruce over fir, favors aspen.

Shelterwood: Heavy shelter favors fir, less shelter favors Douglas-fir and spruce.

Seed Tree: Not usually successful because of blowdown.

Selection: Favors fir.

PLANTING:

Recommended Species: Engelmann spruce, Douglas-fir.

Success Probability: High

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	B	B
Burning	H	H	

REVEGETATION: Moderate to rapid.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 0.8

TSI: Sometimes needed to improve species composition.

PRODUCTIVITY: 20 /\ 100

Site Index $\frac{67 + 7}{\text{PSME}}$ $\frac{55 + 12}{\text{PIEN}}$ N = $\frac{14}{\text{ }}$

Resource Value Rating (Cattle): Early Seral Moderate Late Seral None

OTHER: Important for snow retention; important big game feeding and cover.

Abies lasiocarpa/Vaccinium myrtilus

Corkbark fir/Myrtle huckleberry
 ABLA/VAMY

Typic phase 003200
 LIBO phase 003201
 RUPA phase 003202

SYN: ABLA-PIEN1/VAMY (Johnston 1984); ABLA/VASC (Moir and Ludwig 1979).

SITE: All slopes and aspects > 10,000 ft.; n-facing slopes to 9,500 ft.
 MAP 30-35 in/yr.; heavy winter snowpack.

TES: 7, 0 (Typic phase); 7, -1 (RUPA and LIBO phases).

TREES: (by phase)

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
Typic phase	C	C		S		a	a						
RUPA and LIBO phases	C	C		S	s	S	s						

SHRUBS: Well represented to luxuriant. *Vaccinium myrtilus**, *Lonicera involucrata*, *L. utahensis*, *Ribes wolfii*, *R. montigenum*, *Sorbus dumosa*, *Pachistima myrsinites*. The RUPA phase includes *Acer glabrum*, *Rubus parviflorus**.

HERBS: Common to well represented. *Bromus ciliatus*, *Trisetum montanum*, *Erigeron eximius*, *Ramischia secunda*, *Epilobium angustifolium*, *Pedicularis racemosa*, *Oreochrysum parryi*, *Linnaea borealis* (LIBO phase).

CRYPTOGAMS: Abundant to luxuriant, especially mosses.

DIS: Apache NF, Fort Apache Res. - White Mts. AZ;
 Gila NF - Mogollon Mts., Black Range;
 Coronado NF (Safford RD)-Pinaleno Mts. (southern distribution in U.S.); also n-NM, s-CO, s-UT (LaSal Mts.).

ALSO SEE: ABLA-PIEN1/VASC (Johnston 1984) is closely related but has *Pinus contorta* as a major seral tree; ABLA/VAMY-RUPA of DeVelice et al (1986) appears identical to the RUPA phase, and their ABLA/VAMY-LIBO h.t. is identical to the LIBO phase.

COMMENTS:

Picea pungens/Arctostaphylos uva-ursi

14

Blue spruce/Kinnikinnik
PIPU/ARUV

006080

SYN: Picea pungens-Pseudotsuga menziesii h.t. (Moir and Ludwig 1979);
Picea pungens-Pseudotsuga menziesii/Arctostaphylos uva-ursi
(Johnston 1984).

SITE: Ridges, benches, or slopes within cold air drainages and often s or
w aspects, 8,000-9,100 ft.

TES: 6, 0.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	Q
B	I	I	O	B	S	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	G
A	N	U	R	O	E	L	R	O	D	C	O	A
a		C	S	C	C			s				

SHRUBS: Abundant. Arctostaphylos uva-ursi, Juniperus communis, Pachistima
myrsinites, Berberis repens, Amelanchier alnifolia, Rosa spp.,
Symphoricarpos oreophilus.

HERBS: Common to well represented. Fragaria ovalis, F. americana,
Smilacina stellata, Achillea millefolium, Festuca arizonica,
Muhlenbergia montana, Koeleria macrantha.

DIS: Local in n-NM, s-CO.

ALSO SEE: Picea pungens/Juniperus communis in UT (Youngblood and Mauk 1985)
appears similar. PIPU/FEAR occupies drier, warmer sites.
PIPU/CAFO differs primarily by scarcity of Arctostaphylos uva-ursi

COMMENTS:

H. T.: Blue spruce/Kinnikinnik

REGENERATION METHODS:

Clearcut: Often successful, can favor ponderosa pine, Douglas-fir, and aspen.

Shelterwood: Usually successful, heavy cuts favor ponderosa pine and Douglas-fir, light cuts favor white fir and blue spruce.

Seed Tree: Sometimes successful.

Selection: Favors blue spruce and white fir.

PLANTING:

Recommended Species: Ponderosa pine, Douglas-fir, and Blue spruce.

Success Probability: High

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	B	B
Burning		B	

REVEGETATION: After disturbance, moderately rapid.

STOCKABILITY: BUDWORM SUSCEPTIBILITY: 1.5

TSI: Sometimes useful to improve species composition and reduce budworm susceptibility.

PRODUCTIVITY: PSME

Site Index 61 + ? _____ _____ Productivity Moderate

Resource Value Rating (Cattle): Early Seral low Late Seral none

OTHER: Attractive habitat type with a variety of tree species. Relatively dry for a blue spruce habitat type, good site for Douglas-fir. Provides good selection of options for wildlife habitat diversity.

Picea pungens/Carex foenea

15

Blue spruce/Fony sedge
PIPU/CAFO

006060

SYN:

SITE: Lower slopes and drainages, streamsides, and forest borders of grassy parks, 8,600-9,100 ft.; frost pockets or cold air drainages.

TES: 6, 0.

TREES:

A	P	P	P	A	P	P	P	Q	P	J	J	J
B	I	I	O	B	S	I	I	U	I	U	U	U
L	E	P	T	C	M	S	P	G	E	S	M	D
A	N	U	R	O	E	T	O	A	D	C	O	E
			C	S	c	C	s	S				

SHRUBS: Scarce to well represented. *Juniperus communis*, *Pachistima myrsinites*, *Lonicera arizonica*, *Quercus gambelii*, *Holodiscus dumosus*.

HERBS: Abundant (sometimes luxuriant). *Carex foenea*, *Bromus ciliatus*, *Muhlenbergia montana*, *Erigeron* spp., *Fragaria americana*, *F. ovalis*, *Lathyrus arizonicus*, *Oreochrysum parryi*, *Thalictrum fendleri*, *Senecio wootoni*, *Galium* spp., *Poa pratensis*.

DIS: NM, AZ, and s-CO.

ALSO SEE: PIPU/FROV (Alexander et al 1984); PIPU/ARUV.

COMMENTS:

H. T.: Blue spruce/Fony sedge

REGENERATION METHODS:

- Clearcut: Favors aspen. Can favor ponderosa pine or Douglas-fir if planted promptly.
- Shelterwood: Heavy shelter favors blue spruce and white fir; lighter shelter favors ponderosa pine and Douglas-fir. Blowdown may be a problem on poorly drained soils. Favors aspen.
- Seed Tree: Blowdown of seed trees may be a problem.
- Selection: Favors white fir or blue spruce.

PLANTING:

- Recommended Species: Ponderosa pine, Douglas-fir, blue spruce, white fir.
- Success Probability: High. Be careful on poorly aerated, clayey soils.

SITE PREPARATION

INTENSITY

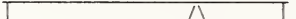
<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical		B	B
Burning	A	B	B

REVEGETATION: Rapid.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 1.0

TSI: Sometimes needed to reduce stocking and increase proportion of ponderosa pine.

PRODUCTIVITY: 20  100

Site Index $\frac{73 + ?}{\text{PIPO}}$ $\frac{89 + ?}{\text{PSME}}$ N = 3

Forage Value Rating (Cattle): Early Seral High Late Seral Low

OTHER: High visual quality with pleasing arrangement of tall, large-diameter pine mixed with aspen and blue spruce. Good potential for producing contrasting stands adjacent to one another.

Picea pungens/Cornus stolonifera

16

Blue spruce/Red ozier dogwood
PIPU/COST

006010

SYN: *Picea pungens*/Amelanchier alnifolia-Swida sericea (Johnston 1984)
Picea pungens/Poa pratensis (Moir and Ludwig 1979).

SITE: Streamsidess and well-watered tributary draws, 8,000-9,100 ft.,
often forming mosaics with valley bottom meadows.

TES: 6, -1, 0, +1.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	P
B	I	I	O	B	S	I	I	I	I	U	U	O
L	E	P	T	C	M	F	A	P	E	S	M	A
A	N	U	R	O	E	L	R	O	D	C	O	N
		a	C	S	a	S	a		a		s	
												s

SHRUBS: Well represented to luxuriant. *Cornus stolonifera*, *Amelanchier alnifolia*, *Alnus tenuifolia*, *Prunus virginiana*, *Symphoricarpos oreophilus*, *Salix scouleriana*, *Salix bebbiana*, *Acer glabrum*, *Lonicera involucrata*.

HERBS: Abundant. *Poa pratensis*, *Calamagrostis canadensis*, *Carex foenea*, *Carex* spp., *Geranium richardsonii*, *Osmorhiza depauperata*, *Taraxacum officinale*, *Smilacina* spp., *Thalictrum fendleri*, *Heracleum sphondylium*, *Geum allepicum*.

DIS: NM, AZ, s-CO.

ALSO SEE: *Picea pungens*/Swida sericea (DeVelice et al 1986); riparian forests. The PIPU/POPR forest described by Moir and Ludwig (1979) is probably a derived community type (from grazing and browsing).

COMMENTS:

H. T.: Blue spruce/Red ozier dogwood

REGENERATION METHODS:

- Clearcut: May result in conversion to bluegrass meadow, favors aspen if protected from livestock.
- Shelterwood: Usually successful, but may suffer blowdown on poorly drained sites.
- Seed Tree: Often results in conversion to bluegrass meadow, and may suffer blowdown.
- Selection: Favors spruce; usually the best method on riparian pastures.

PLANTING:

Recommended Species: Blue spruce, Douglas-fir.

Success Probability: Moderate, sites subject to frost action.

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical		B	
Burning	H		

REVEGETATION: Very rapid.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 0.8

TSI: Usually unnecessary.

PRODUCTIVITY:

Site Index + + + Productivity Moderate

Forage Value Rating (Cattle): Early Seral H Late Seral M

OTHER: Prime recreational, visual, wildlife, and livestock habitat. Tree regeneration can be eliminated by wildlife or livestock use after clearing or fire. Periodic flooding may bring about tree and meadow mosaics.

Picea pungens/Erigeron eximus

17

Blue spruce/Forest fleabane
PIPU/EREX

Typic phase 006070
PIPO phase 006071

SYN: *Picea pungens*-*Pseudotsuga menziesii* h.t., *Valeriana acutiloba* phase (Moir and Ludwig 1979); PIPU-PSME/EREX (Johnston 1984).

SITE: Gentle slopes and plateau summits, 9,000-9,400 ft.; moderate and steep n-slopes adjoining canyon bottom drainages > 8,000 ft.; cold air drainages and frost pockets.

TES: 7, -1 (typic phase); 6, +1 (PIPO phase).

TREES: (by phase)

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
Typic phase		c	C	S	s	C	s						
<i>Pinus ponderosa</i> phase			C	S	c	C	s		s				

SHRUBS: Well represented. *Acer glabrum*, *Quercus gambelii*, *Amelanchier alnifolia*, *Lonicera arizonica*, *Pachistima myrsinites*, *Juniperus communis*, *Rosa arizonica*.

HERBS: Abundant to luxuriant. *Erigeron eximus*, *E. formosissimus*, *Thalictrum fendleri*, *Fragaria americana*, *F. ovalis*, *Geranium richardsonii*, *Artemisia franserioides*, *Viola canadensis*, *Smilacina* spp., *Valeriana capitata*, *Bromus ciliatus*, *Poa fendleriana*, *Koeleria macrantha*, *Carex* spp.

CRYPTOGAMS: Abundant.

DIS: NM, AZ, s-CO.

ALSO SEE: PIEN/EREX where Picea pungens can be seral.

COMMENTS:



fruit

RHTR



Rhus trilobata (skunkbush sumac)

Picea pungens/Festuca arizonica

18

Blue spruce/Arizona fescue
PIPU/FEAR

006080

SYN:

SITE: Gentle to steep, s- to w-slopes, 8,200-9,200 ft., in frost pockets or cold air drainages, often adjoining meadows.

TES: 6, -1.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	Q
B	I	I	O	B	S	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	G
A	N	U	R	O	E	L	R	O	D	C	O	A
			C	s	c	C	s		S			

SHRUBS: Scarce. Ribes cereum, R. pinetorum.

HERBS: Well represented or abundant. Festuca arizonica*, Muhlenbergia montana, Carex foenea, C. rossii, Danthonia parryi, Koeleria macrantha, Sitanion hystrix, Erigeron formosissimus, Potentilla hippiana, Fragaria spp., Lathyrus spp., Muhlenbergia virescens.

DIS: NM, c- and n-AZ, s-CO.

ALSO SEE:

COMMENTS:

H. T.: Blue spruce/Arizona fescue

REGENERATION METHODS:

Clearcut: Sometimes successful, can favor aspen or ponderosa pine. Clearcuts should be planted promptly to avoid grass competition.

Shelterwood: Usually successful, favors spruce and Douglas-fir.

Seed Tree: Sometimes successful, favors ponderosa pine.

Selection: Favors spruce.

PLANTING:

Recommended Species: Ponderosa pine, Douglas-fir, blue spruce.

Success Probability: High

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	B	B	B
Burning	B	B	B

REVEGETATION: Usually rapid.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 1.0

TSI: Sometimes needed to reduce stocking and increase proportion of ponderosa pine.

PRODUCTIVITY: 20 $\frac{\Delta}{\quad}$ 100

Site Index $\frac{48 + ?}{\text{PSME}}$ N = $\frac{4}{\quad}$

Forage Value Rating (Cattle): Early Seral H Late Seral L

OTHER: High visual quality when adjoining meadows or roads (diversity of trees); usually relatively poor site for aspen. Moderate site for ponderosa pine (better than limited data for Douglas-fir suggests).

Picea pungens/Linnaea borealis

Blue spruce/Twinflower
PIPU/LIBO

006040

SYN: *Picea pungens*-*Pseudotsuga menziesii*/*Linnaea borealis*
(Johnston 1984).

SITE: Lower n-facing slopes, 8,200-9,200 ft. along cold air drainages.

TES: 7, -1.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	Q
B	I	I	O	B	S	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	G
A	N	U	R	O	E	L	R	O	D	C	O	A
c	c	C	S	s	S	s		a				

SHRUBS: Well represented. *Juniperus communis*, *Pachistima myrsinites*, *Rubus parviflorus*, *Vaccinium myrtillus*, *Symphoricarpos oreophilus*.

HERBS: Abundant to luxuriant. *Linnaea borealis**, *Ramischia secunda*, *Thalictrum fendleri*, *Geranium richardsonii*, *Erigeron eximius*, *Fragaria* spp., *Bromus ciliatus*, *Oryzopsis asperifolia*, *Carex foenea*, *Trisetum montanum*.

CRYPTOGAMS: Abundant, especially mosses and the nitrogen-fixing lichen, *Parmelia aphthosa*.

DIS: Local in n-NM, s-CO.

ALSO SEE: PIPU/EREX is similar but does not contain as rich a component of low, evergreen shrubs and herbs.

COMMENTS:

H. T.: Blue spruce/Forest fleabane

REGENERATION METHODS:

Clearcut: Favors aspen; conifer regeneration sometimes susceptible to frost damage.

Shelterwood: Usually successful; heavy shelter favors spruce, lighter shelter favors Douglas-fir.

Seed Tree: Sometimes successful.

Selection: Favors spruce and white fir.

PLANTING:

Recommended Species: Blue spruce, Douglas-fir.

Success Probability: High

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	B	B
Burning	A	A	

REVEGETATION: Usually rapid.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 1.5

TSI: Sometimes needed to reduce stocking and reduce proportion of white fir.

PRODUCTIVITY: 20 / 100

Site Index 63 + 10 _____ N = 10
PSME

Forage Value Rating (Cattle): Early Seral M Late Seral L

OTHER: High visual quality along meadow borders and roads; good potential for thermal and hiding cover; good possibilities for aspen management.

Pinus flexilis/Arctostaphylos uva-ursi

20

Limber pine/Kinnikinnik
PIFL/ARUV

240300

SYN: *Pinus flexilis*/Juniperus communis (Johnston 1984, Hess and Alexander 1986).

SITE: Upper slopes and ridgetops, 9,500-10,000 ft., high insolation and evapotranspiration.

TES: 7, -1.

TREES:

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
		c		S		C	C		a				

SHRUBS: Well represented or abundant. *Arctostaphylos uva-ursi**, *Juniperus communis*.

HERBS: Poorly represented. *Carex rossii*, *Koeleria macrantha*, *Solidago* spp., *Oreochrysum parryi*.

CRYPTOGAMS:

DIS: n-NM to CO and WY.

ALSO SEE: Climatic data at station C-1 in Marr (1961) and subsequent records from Inst. Arctic and Alpine Res., Univ. Colorado, Boulder.

COMMENTS: In this h.t. *Pinus flexilis* resembles its northern populations and is distinct from *Pinus strobiformis*.

H. T.: Limber pine/Kinnikinnik

REGENERATION METHODS:

Clearcut: Not usually successful.
Shelterwood: Usually successful.
Seed Tree: Not usually successful.
Selection: Usually successful.

PLANTING:

Recommended Species: Douglas-fir, Limber pine.
Success Probability: Moderate

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	B	B
Burning	H		

REVEGETATION: After disturbance, very slow.

STOCKABILITY: 1 BUDWORM SUSCEPTIBILITY: 1.1

TSI: Not usually needed.

PRODUCTIVITY:

Site Index ? + + + Productivity Low

Resource Value Rating (Cattle): Early Seral None Late Seral None

OTHER: Cool dry habitat type. One of the few sites where Limber pine can dominate and thus is important for diversity of wildlife habitats.

Abies concolor/Acer glabrum

21

White fir/Rocky Mountain maple
ABCO/ACGL

001010

SYN: *Abies concolor*-*Pseudotsuga menziesii*/*Acer glabrum* (Johnston 1984).

SITE: Often n- or e-slopes, 9,000-9,800 ft., (as low as 8,500 ft. along drainages); MAP 29 in/yr.

TES: 6, +1.

TREES:

A	P	P	P	A	P	P	Q	P	P	J	J	J
B	I	I	O	B	S	I	U	I	I	U	U	U
L	E	P	T	C	M	F	G	P	E	S	M	D
A	N	U	R	O	E	L	A	O	D	C	O	E
	a		S	C	C	s		a				

SHRUBS: Well represented or abundant. *Acer glabrum**, *Salix scouleriana*, *Amelanchier alnifolia*, *Holodiscus dumosus*, *Quercus gambelii*, *Physocarpus monogynus*, *Pachistima myrsinites*, *Symphoricarpos oreophila*, *Lonicera arizonica*, *Berberis repens*, *Robinia neomexicana*, *Jamesia americana*.HERBS: Well represented. *Bromus ciliatus*, *Artemisia franserioides*, *Viola canadensis*, *Oreochrysum parryi*, *Thalictrum fendleri*, *Fragaria americana*, *Osmorhiza depauperata*, *Geranium richardsonii*, *Lathyrus arizonicus*, *Smilacina racemosa*, *Disporum trachycarpum*.

CRYPTOGAMS:

DIS: Widespread throughout mountains of the Southwest.

ALSO SEE: ABCO/EREX has a luxuriant herbaceous understory.

COMMENTS: *Abies concolor* is occasionally absent in some isolated mountain ranges by accident of dispersal and migration.

H. T.: White fir/Rocky Mountain maple

REGENERATION METHODS:

Clearcut: Favors aspen and maple.

Shelterwood: Is usually successful.

Seed Tree: Sometimes successful, can favor Douglas-fir if seed trees are Douglas-fir.

Selection: Favors white fir.

PLANTING:

Recommended Species: Douglas-fir.

Success Probability: High

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	B	B	B
Burning	A	A	

REVEGETATION: Rapid due to sprouting.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 1.7

TSI: Sometimes needed to reduce white fir and budworm susceptibility.

PRODUCTIVITY: 20 / 100

Site Index $\frac{61 + \text{PSME}}{\text{PSME}}$ N = 24

Forage Value Rating (Cattle): Early Seral H Late Seral L

OTHER: Maple component lends high visual quality in autumn. Good potential for aspen management. Excellent browse and hiding cover for wildlife (especially deer, elk, black bear).

Abies concolor/Arctostaphylos uva-ursi

22

White fir/Kinnikinnik
ABCO/ARUV

001090

SYN: *Abies concolor*-*Pseudotsuga menziesii*/*Arctostaphylos uva-ursi*
(Johnston 1984).

SITE: Upper slopes and ridgetops, 7,900-9,500 ft.

TES: 6, 0.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	Q
B	I	I	O	B	S	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	G
A	N	U	R	O	E	L	R	O	D	C	O	A
			s	C	C	s		S				

SHRUBS: Abundant. *Arctostaphylos uva-ursi**, *Pachistima myrsinites*,
Juniperus communis, *Shepherdia canadensis*, *Rosa* sp., *Quercus*
gambelii (<5% cover), *Berberis repens*.

HERBS: Scarce or common. *Poa fendleriana*, *Carex rossii*, *Koeleria*
macrantha, *Muhlenbergia montana*, *Fragaria ovalis*, *Oreochrysum*
parryi, *Solidago sparsiflora*.

CRYPTOGAMS:

DIS: n-NM, s-CO.

ALSO SEE:

COMMENTS:

H. T.: White fir/Kinnikinnik

REGENERATION METHODS:

- Clearcut: Often successful, favors ponderosa pine and Douglas-fir, planting often needed.
- Shelterwood: Usually successful, heavier cuts favor ponderosa pine and Douglas-fir.
- Seed Tree: Often successful.
- Selection: Favors white fir.

PLANTING:

Recommended Species: Ponderosa pine, Douglas-fir.

Success Probability: High

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical		B	B
Burning	B	B	

REVEGETATION: After disturbance, usually rapid.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 1.5

TSI: Can be used to reduce budworm susceptibility by reducing white fir component.

PRODUCTIVITY: PSME PIPO

Site Index 57 + 10 54 + 11 + Productivity Moderate

Forage Value Rating (Cattle): Early Seral Moderate Late Seral None

OTHER: Common juniper is often present in the understory and can provide very good nesting habitat for turkeys. Berries from kinnikinnik provide a food source. Can be important winter range in open winters.

Abies concolor/Berberis repens

23

White fir/Oregon grape
ABCO/BERE

001020

SYN: *Abies concolor*-*Pseudotsuga menziesii*/(sparse understory) (Moir and Ludwig 1979), ABCO-PSME/sparse (Johnston 1984), ABCO/sparse (DeVelice et al 1986).

SITE: Numerous slopes, aspects, and landforms 8,500-9,500 ft.; MAP 27-28 in/yr.

TES: 6, 0.

TREES:

A	P	P	P	A	P	P	P	Q	P	J	J	J
B	I	I	O	B	S	I	I	U	I	U	U	U
L	E	P	T	C	M	S	P	G	E	S	D	M
A	N	U	R	O	E	T	O	A	D	C	E	O
a	a		S	C	C	S	s					

NO SHRUB OR HERB SPECIES IS DIAGNOSTIC OR INDICATIVE OF THIS HABITAT TYPE.

SHRUBS: Common or well represented. *Quercus gambelii*, *Robinia neomexicana*, *Symphoricarpos oreophilus*, *Berberis repens*, *Holodiscus dumosus*, *Lonicera* spp., *Pachistima myrsinites*, *Rubus parviflorus*, *Sambucus* spp.

HERBS: Scarce (occasional species may reach 2-3 percent cover). *Oreochrysum parryi*, *Thalictrum fendleri*, *Pteridium aquilinum*, *Carex rossii*, *Fragaria* spp., *Bromus ciliatus*, *Poa fendleriana*, *Smilacina* spp.

Sparseness of herbs in mature stands is diagnostic.

CRYPTOGAMS:

DIS: Widespread throughout NM, CO, AZ, UT.

ALSO SEE: ABCO-PSME/SYORI (Johnston 1984); *Abies concolor*/*Symphoricarpos oreophilus* h.t. (Youngblood and Mauk 1985). If *Quercus gambelii* attains > 5 percent cover and shade tolerant herbs are well represented, then see ABCO/QUGA.

COMMENTS: Seral stages may be difficult to assign to this h.t. because shrubs and herbs can be well represented or abundant.

H. T.: White fir/Oregon grape; White fir/sparse

REGENERATION METHODS:

Clearcut: May be needed in mistletoe infected stands and usually successful if followed by planting.

Shelterwood: Usually successful; heavy shelter favors white fir over other conifers.

Seed Tree: Sometimes successful if seed trees are Douglas-fir or ponderosa pine.

Selection: Favors white fir.

PLANTING: Dougals-fir, Southwestern white pine, ponderosa pine.

Recommended Species:

Success Probability: Moderate to high.

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	B	
Burning	H	B	

REVEGETATION: Moderate to slow due to dryness or nutrient restrictions; Aspen is usually short-lived.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 1.7

TSI: Sometimes needed.

PRODUCTIVITY: 20 _____ / \ _____ 100

Site Index $\frac{71 + 10}{\text{PIPO}}$ $\frac{67 + 12}{\text{PSME}}$ _____ N = 67

Resource Value Rating (Cattle): Early Seral M-H Late Seral None

OTHER: Poor site quality for aspen; early seral stages are productive for wildlife forage. Some common seral shrubs include Sambucus, Rubus strigosus, Ribes spp., Symphoricarpos oreophilus, Robinia neomexicana, Holodiscus dumosus, Quercus gambelii. Herbs also respond well.

Abies concolor/Erigeron eximius

24

White fir/Forest fleabane
ABCO/EREX

001030

SYN: *Abies concolor*-*Pseudotsuga menziesii*/*Erigeron eximius* (Johnston 1984).

SITE: Numerous slopes, aspects, and landforms between 8,700-9,700 ft.; MAP 29 in/yr.

TES: 6, +1.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	J
B	I	I	O	B	S	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	D	M
A	N	U	R	O	E	L	R	O	D	C	E	O
	a		S	C	C	s		a				

SHRUBS: Scarce to abundant. *Acer glabrum*, *Salix scouleriana*, *Holodiscus dumosus*, *Quercus gambelii*, *Ribes pinetorum*, *Lonicera arizonica*, *Pachistima myrsinites*, *Robinia neomexicana*, *Symphoricarpos oreophila*.

HERBS: Luxuriant. *Erigeron eximius*, *Oreochrysum parryi*, *Lathyrus* spp., *Geranium richardsonii*, *Valeriana capitata*, *Fragaria ovalis*, *Artemisia franserioides*, *Viola canadensis*, *Bromus ciliatus*, *Trisetum montanum*, *Carex foenea*, *Actaea rubra*, *Osmorhiza depauperata*.

CRYPTOGAMS:

DIS: Local in forests of AZ and s-UT; widespread in NM and s-CO.

ALSO SEE: ABCO/ACGL is very similar, but has less herb cover, and may indicate more cobbly or stony soils. ABCO/RONE, CAFO phase usually does not have luxuriant herbs and often occurs on soils with high content of volcanic ash. ABCO/LAAR is similar but has a rich legume component (e.g. *Lathyrus* spp.) and greater importance of ponderosa pine as a seral tree.

COMMENTS:

H. T.: White fir/Forest fleabane

REGENERATION METHODS:

Clearcut: Favors aspen and to lesser extent, Douglas-fir. Usually needs planting to assure conifer regeneration.

Shelterwood: Usually successful.

Seed Tree: Sometimes successful if Douglas-fir are seed trees.

Selection: Favors white fir.

PLANTING:

Recommended Species: Douglas-fir, Southwestern white pine, white fir.

Success Probability: High

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	B	B
Burning	A	A	

REVEGETATION: Rapid, strong herb and shrub response.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 1.7

TSI: Sometimes needed to reduce proportion of white fir and to reduce budworm susceptibility.

PRODUCTIVITY: 20 / 100

Site Index 72 + 9 _____ N = 28
PSME

Forage Value Rating (Cattle): Early Seral H Late Seral M

OTHER: Good wildlife food and cover. Good potential for aspen management. Luxuriant understories have high visual appeal in mature stands along roads or bordering meadows.

Abies concolor/Festuca arizonica

White fir/Arizona fescue
 ABCO/FEAR

FEAR phase 011040
 POFE phase 001041
 QUGA phase 001042

SYN: *Abies concolor*-*Pseudotsuga menziesii*/*Festuca arizonica* (Johnston 1984).

SITE: Many slopes and aspects 8,200-9,500 ft.; MAP 26-28 in/yr., dry season May-June, high evaporation.

TES: 6, 0.

TREES: (by phase)

	A	P	P*	P	A	P	P	P	Q	P	J	J	J
	B	I	I	O	B	S	I	I	U	I	U	U	U
	L	E	P	T	C	M	S	P	G	E	S	D	M
	A	N	U	R	O	E	T	O	A	D	C	E	O
FEAR & POFE			c	s	C	C	s	S					
QUGA			c	s	C	C	s	S	s				

*PIPU on sites adjoining cold air drainage.

SHRUBS: Scarce. *Quercus gambelii*, *Holodiscus dumosus*, *Ribes pinetorum*, *Pachistima myrsinites*, *Robinia neomexicana*.

HERBS: Abundant. *Festuca arizonica**, *Muhlenbergia montana*, *Danthonia parryi*, *Poa fendleriana*, *Carex foenea*, *C. rossii*, *Sitanion hystrix*, *Bromus ciliatus*, *Antennaria* spp., *Erigeron formosissimus*, *Lathyrus arizonicus*, *Vicia americana*, *Frageria* spp., *Potentilla hippiana*.

CRYPTOGAMS:

DIS: Widespread in AZ, NM, s-CO.

ALSO SEE: ABCO/QUGA, *Festuca arizonica* phase; PSME/FEAR. The QUGA phase of ABCO/FEAR has gambel oak < 5 percent cover; the POFE phase has little or no *Festuca arizonica*. Along cold air drainages see also PIPU/FEAR. ABCO/LAAR and ABCO/RONE also have abundant or luxuriant herbaceous understories in colder or wetter environments.

COMMENTS: On certain grazing allotments *Poa pratensis* may be abundant. Forests in late succession may have few bunchgrasses (e.g. *Festuca arizonica*, etc), but these remain well expressed in local openings.

H. T.: White fir/Arizona fescue

REGENERATION METHODS:

Clearcut: Can be successful and necessary in mistletoe infested areas; can be used to favor aspen locally; plant to favor conifers.

Shelterwood: Heavy shelter favors white fir and Douglas-fir, less shelter favors ponderosa pine.

Seed Tree: Can be successful if ponderosa pine and Douglas-fir seed trees are left.

Selection: Favors white fir.

PLANTING:

Recommended Species: Ponderosa pine, Douglas-fir.

Success Probability: High.

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	B	B	B
Burning	B	B	

REVEGETATION: Usually rapid (strong herbaceous response).

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 1.5

TSI: Often needed to reduce stocking and to reduce white fir component of stand.

PRODUCTIVITY: 20 / \ 100

Site Index $\frac{77 +}{\text{PIPO}}$ $\frac{63 +}{\text{PSME}}$ + N = 7

Resource Value Rating (Cattle): Early Seral H Late Seral L

OTHER: Excellent sites for ponderosa pine and growth of scenic, large yellow pines. Low intensity (surface) fires can be a useful management tool. Mosaics of stands of different successional stages have good wildlife benefits.

Abies concolor/Lathyrus arizonicus

White fir/Arizona peavine
 ABCO/LAAR

001070

SYN: *Abies concolor*-*Pseudotsuga menziesii*/*Lathyrus arizonicus* (Moir and Ludwig 1979).

SITE: N-slopes and elevated plains 8,500-9,400 ft.; MAP = 27 in/yr.

TES: 6, 0.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	J
B	I	I	O	B	S	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	D	M
A	N	U	R	O	E	L	R	O	D	C	E	O
a		a	S	C	C	s		s				

SHRUBS: Common to well represented. *Berberis repens*, *Symphoricarpos oreophilus*, *Lonicera arizonica*, *Juniperus communis*, *Pachistima myrsinites*.

HERBS: Well represented to luxuriant. *Lathyrus arizonicus*, *Smilacina stellata*, *Disporum trachycarpum*, *Thalictrum fendleri*, *Poa fendleriana*, *Carex foenea*, *C. geyeri*, *Liquisticum porteri*, *Thermopsis pinetorum*.

CRYPTOGAMS:

DIS: n-AZ (Bill Williams Mt, San Francisco Peaks), local in NM.

ALSO SEE: As environments become drier, this h.t. grades into ABCO/BERE. The well expressed herb cover, however, distinguishes ABCO/LAAR. ABCO/FEAR is also similar, but occurs on warmer sites. ABCO/EREX indicates colder environments. See TES mapping unit 350 for Carson National Forest (Edwards 1987).

COMMENTS:

H. T.: White fir/Arizona peavine

REGENERATION METHODS:

Clearcut: Favors aspen and pine.

Shelterwood: Heavy shelter favors white fir and Douglas-fir, less shelter favors pine.

Seed Tree: Can be successful if Douglas-fir and ponderosa pine are left.

Selection: Favors white fir.

PLANTING:

Recommended Species: Douglas-fir, ponderosa pine (on selected sites).

Success Probability: High

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	B	B	B
Burning	A	A	

REVEGETATION: Rapid (strong herbaceous response).

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 1.5

TSI: May be needed to reduce stocking or white fir component.

PRODUCTIVITY:

Site Index _____ Productivity High

Forage Value Rating (Cattle): Early Seral Moderate Late Seral Low

OTHER: High scenic quality with good potential for tall aspen groves.

Abies concolor/Quercus gambellii

White fir/Gambel oak
 ABCO/QUGA

QUGA phase 001050
 FEAR phase 001052

SYN: ABCO-PSME/QUGA (Johnston 1984).

SITE: A wide array of sites, 7,400-9,600 ft., but commonly on moderate to very steep slopes; MAP 27 in/yr (can be as low as 24 in/yr e.g., Sunspot, NM).

TES: 6, 0.

TREES:

A	P	P	P	A	P	P	P	Q	P	J	J	J
B	I	I	O	B	S	I	I	U	I	U	U	U
L	E	P	T	C	M	F	P	G	E	S	D	M
A	N	U	R	O	E	L	O	A	D	C	E	O
			a	C	C	S	S	S	a		a	

SHRUBS: Usually abundant. *Quercus gambellii**, *Robinia neomexicana*, *Symphoricarpos oreophilus*, *Rosa* spp., *Pachistima myrsinites*, *Berberis repens*, *Jamesia americana*.

HERBS: Well represented or abundant. *Poa fendleriana*, *Bromus ciliatus*, *Carex rossii*, *Koeleria macrantha*, *Festuca arizonica* (FEAR phase), *Muhlenbergia montana*, *Danthonia parryi* (FEAR phase), *Geranium* spp., *Thalictrum fendleri*, *Achillea millefolium*, *Vicia americana*, *Lathyrus arizonicus*, *Thermopsis divaricarpa*.

CRYPTOGAMS:

DIS: Common and widespread throughout the Southwest (AZ, NM, UT, s-CO).

ALSO SEE: ABCO/FEAR or ABCO/SYOR if *Quercus gambellii* is poorly represented.

COMMENTS:

H. T.: White fir/Gambel oak

REGENERATION METHODS:

Clearcut: Strongly favors oak.

Shelterwood: Favors conifers if enough shelter is retained to partially suppress oaks.

Seed Tree: Favors oak.

Selection: Favors white fir.

PLANTING:

Recommended Species: Ponderosa pine, Douglas-fir.

Success Probability: High

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	B	B	
Burning	H	H	

REVEGETATION: Rapid due to oak sprouting.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 1.5

TSI: Usually needed to reduce proportions of white fir and competition from oak.

PRODUCTIVITY: 20 / 100

Site Index $\frac{61 + 12}{PSME}$ $\frac{59 + 10}{PIPO}$ N = 20

Resource Value Rating (Cattle): Early Seral L-M Late Seral L-N

OTHER: Good food and cover for wildlife in all successional stages. For description of successional stages see Hanks and Dick-Peddie (1974).

Abies concolor/Robinia neomexicana

White fir/New Mexico locust
ABCO//RONE

RONE phase 001110
CAFO phase 001111

SYN:

SITE: Cinder cones and volcanic ash soils, 8,500-8,800 ft.; MAP 27
in/yr.

TES: 6, 0

TREES: (by phase)

	A	P	P	P	A	P	P	P	Q	P	J	J	J
	B	I	I	O	B	S	I	I	U	I	U	U	U
	L	E	P	T	C	M	F	P	G	E	S	D	M
	A	N	U	R	O	E	L	O	A	D	C	E	O
<i>Robinia neomexicana</i>				S	C	S	s	S					
<i>Carex foenea</i> (n-NM)				S	C	C		S					

SHRUBS: Well represented to abundant. *Robinia neomexicana*, *Lonicera arizonica*, *Quercus gambelii*, *Amelanchier alnifolia*, *Rubus parviflorus*, *Rubus strigosus*, *Acer glabrum*.

HERBS: Well represented. *Carex foenea*, *Fragaria americana*, *Smilacina stellata*, *S. racemosa*, *Geranium richardsonii*, *Viola canadensis*, *Bromus ciliatus*, *Oryzopsis asperifolia*.

CRYPTOGAMS:

DIS: Apache NF (Springerville and Lakeside RDs) - volcanic cones, AZ;
Santa Fe NF (Jemez RD) - Jemez Cauldera and vicinity, Jemez Mts, NM
possibly local in other areas.

ALSO SEE: ABCO/EREX, ABCO/QUGA, ABCO/LAAR, and ABCO/FEAR.

COMMENTS:

H. T.: White fir/New Mexico locust

REGENERATION METHODS:

Clearcut: Favors locust and dense sedge and should be planted quickly.

Shelterwood: Usually successful if enough shelter is retained to suppress locust, sedges, and other herbs.

Seed Tree: Favors shrubs and herbs, seldom successful.

Selection: Favors white fir.

PLANTING:

Recommended Species: Ponderosa pine, Douglas-fir.

Success Probability: Moderate to high.

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	B	B	B
Burning	H, A	H	

REVEGETATION: Rapid from locust establishment and herbs.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 1.7

TSI: Sometimes needed to reduce stocking or severe shrub competition.

PRODUCTIVITY:

Site Index 63 + ? _____ _____ Productivity M to H
PIPO

Forage Value Rating (Cattle): Early Seral High Late Seral Low

OTHER: Early seral stages provide good wildlife forage and cover. Certain soils are high productivity for ponderosa pine but have severe soil limitations (see TES reports).



**White fir/New Mexico locust
Habitat Type (28)**

Abies concolor/Symphoricarpos oreophilus

29

White fir/Snowberry
ABCO/SYOR

PIPO phase 001140
PIFL phase 001141

SYN: *Abies concolor*-*Pseudotsuga menziesii*/*Symphoricarpos oreophilus*
(Johnston 1984).

SITE: Mostly steep slopes, 8,500-9,500 ft., but to 10,500 ft., on s or w slopes; deep cobbly or gravelly soils (often Typic Dystochrepts).

TES: 6, 0, (PIPO phase); 6, +1 (PIFL phase).

TREES: (by phase)

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
<i>Pinus ponderosa</i>				s	C	C			S				
<i>Pinus flexilis</i>				s	C	C	S	s					

SHRUBS: Well represented. *Symphoricarpos oreophilus*, *Holodiscus dumosus*, *Jamesia americana*, *Juniperus communis*, *Berberis repens*, *Quercus gambelii*, *Acer glabrum*, *Physocarpus monogynus*.

HERBS: Common to well represented. *Bromus ciliatus*, *Koeleria macrantha*, *Poa fendleriana*, *Carex foenea*, *C. rossii*, *Oreochrysum parryi*, *Achillea millefolium*, *Allium cernuum*, *Lathyrus arizonicus*, *Senecio* spp.

CRYPTOGAMS:

DIS: n-NM and n-AZ into UT and CO.

ALSO SEE: Youngblood and Mauk (1985) describe a h.t. in UT resembling our PIPO phase; TES mapping unit 922 on Carson NF (Edwards 1987). ABCO/ACGL intergrades into ABCO/SYOR but typically occupies wetter or colder sites. ABCO/BERE occupies drier or more nutrient impoverished sites.

COMMENTS:

Abies concolor/Vaccinium myrtillus

White fir/Myrtle leaf huckleberry
 ABCO//VAMY

001100

SYN: *Abies concolor*-*Pseudotsuga menziesii*/*Vaccinium myrtillus* (Johnston 1984).

SITE: Cold n-slopes and draws, mostly 8,700-9,400 ft.; wide range of soils; moderate snowpack (see comment).

TES: 7, -1.

TREES:

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
	c	c		S	C	C			a				

SHRUBS: Luxuriant. *Vaccinium myrtillus**, *Pachistima myrsinites*, *Acer glabrum*, *Amelanchier alnifolia*, *Berberis repens*, *Symphoricarpos oreophilus*, *Rubus parviflorus*.

HERBS: Well represented. *Erigeron eximius*, *Artemisia franserioides*, *Fragaria ovalis*, *Lathyrus* spp., *Viola canadensis*, *Bromus ciliatus*, *Oryzopsis asperifolia*.

CRYPTOGAMS:

DIS: n-NM, s-CO.

ALSO SEE:

COMMENTS: This is the coldest of the white fir habitat types; it is also the warmest extreme of the cryic soil temperature regime.

Pseudotsuga menziesii/Berberis repens

Douglas-fir/Oregon Grape
PSME/BERE

012030

SYN: Pseudotsuga menziesii/sparse undergrowth (Alexander et al 1984),
Pseudotsuga menziesii/Mahonia repens (Johnston 1984).

SITE: Special topographic sites that are relatively dry and possibly
nutrient poor on a variety of slopes and aspects, 7,000-8,500 ft.

TES: 6, -1.

TREES:

	A	P	P	P	A	P	P*	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
					a		C	S		s	s		

*See comment.

SHRUBS: Poorly represented. Berberis repens, Juniperus communis,
Symphoricarpos oreophilus, Pachistima myrsinites, Quercus gambelii,
Ceanothus fendleri.

HERBS: Scarce or poorly represented. Poa fendleriana, Festuca arizonica,
Bromus ciliatus, Valeriana capitata (V. acutiloba), Clematis
columbiana, Thalictrum fendleri, Antennaria parvifolia.

CRYPTOGAMS:

DIS: c-AZ into UT and ID; local in n-NM and s-CO.

ALSO SEE: PSME/PHMO if shrubs are well represented. If herb cover is well
represented see PSME/FEAR. If Quercus gambelii is well
represented see PSME/QUGA.

COMMENTS: On the North Kaibab plateau, Pinus flexilis is usually absent from
this association.

Pseudotsuga menziesii/Bromus ciliatusDouglas-fir/Fringed brome
PSME/BRCI

012320

SYN:

SITE: Ridges and n- or e-facing upper slopes with deep soils, 9,300-10,100 ft.; cold, wet, windy sites, but dry in May and June.

TES: 6, +1.

TREES:

	A	P	P	P	A	P	P	P	Q	P	J	J	J
	B	I	I	O	B	S	I	I	U	I	U	U	U
	L	E	P	T	C	M	S	P	G	E	S	D	M
	A	N	U	R	O	E	T	O	A	D	C	E	O
		a		s		C	S	a					

SHRUBS: Scarce to abundant. *Holodiscus dumosus*, *Acer glabrum*, *Physocarpus monogynus*, *Jamesia americana*, *Ribes pinetorum*.HERBS: Luxuriant. *Bromus ciliatus*, *Poa fendleriana*, *Trisetum montanum*, *Achillea millefolium*, *Erigeron eximius*, *Oreochrysum parryi*, *Thalictrum fendleri*, *Vicia americana*, *Smilacina stellata*.

CRYPTOGAMS:

DIS: se-AZ and sw- to c-NM, local in n-NM.

ALSO SEE: ABCO/EREX if *Abies concolor* has common regeneration in mature stands. PSME/FEAR, *Populus tremuloides* phase represents an environment integrating to PSME/BRCI.

COMMENTS:

H. T.: Douglas-fir/Fringed brome

REGENERATION METHODS:

Clearcut: Can be successful if planted promptly. Large openings are subject to wind scouring.

Shelterwood: Is usually successful.

Seed Tree: Windthrow is a problem especially when soils are wet.

Selection: Favors Douglas-fir.

PLANTING:

Recommended Species: Southwestern white pine, Douglas-fir.

Success Probability: High if planted before site is occupied by grasses and sedges.

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	B	B
Burning		B	B

REVEGETATION: Rapid due to herbaceous regrowth.

STOCKABILITY: 1 BUDWORM SUSCEPTIBILITY: 1.7

TSI: Sometimes needed to reduce stocking.

PRODUCTIVITY: (no data)

Site Index _____ Productivity Moderate

Resource Value Rating (Cattle): Early Seral H Late Seral M-L

OTHER: Excellent summer range for deer and elk. Early seral stages have good forage for turkeys and small mammals.

Pseudotsuga menziesii/Festuca arizonica

	Typic phase	012330
	Pinus aristata phase	012331
Douglas-fir/Arizona fescue	Pinus flexilis phase	012332
PSME/FEAR	Populus tremuloides ph.	012333

SYN: Pinus strobiformis/Festuca arizonica (Moir and Ludwig 1979).

SITE: Dry upper s-slopes or ridges, 9,200-10,200 ft.

TES: 6, -1.

TREES:

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
PIAR and PIFL phases				s	a	C	c	c	s				
Populus tremuloides phase				S	a	C	s	s	S				

SHRUBS: Common or well represented. *Holodiscus dumosus*, *Quercus gambelii*, *Ceanothus fendleri*, *Ribes cercum*, *Symphoricarpos oreophilus*, *Arctostaphylos uva-ursi* (NM and s-CO).

HERBS: Well represented (sometimes abundant). *Festuca arizonica*, *Bromus ciliatus*, *Muhlenbergia montana*, *Poa fendleriana*, *Koeleria macrantha*, *Achillea millefolium*, *Lathyrus arizonicus*, *Senecio wootoni*, *Erigeron formosissimus*, *Poa pratensis* (especially in POTR phase).

DIS: Local throughout NM, s-CO, and c-AZ.

ALSO SEE: PSME/BRCI occurs on wetter, colder sites; PSME/MUMO and PIAR/FEAR are environmentally indistinguishable. For description of PSME/FEAR in AZ see Alexander et al 1984b; in n-NM and s-CO, DeVelice et al 1986.

COMMENT: In Zuni Mts, NM and locally elsewhere, PSME/FEAR, POTR phase may be indistinguishable from ABCO/FEAR (where *Abies concolor* is absent by accident of geography and migration (Alexander et al 1987)).

H. T.: Douglas-fir/Arizona fescue

REGENERATION METHODS:

Clearcut: Can be successful, especially if kept small.

Shelterwood: Is usually successful.

Seed Tree: Is sometimes useful to favor ponderosa pine.

Selection: Is usually successful in mistletoe free stands.

PLANTING:

Recommended Species: Ponderosa pine, Douglas-fir.

Success Probability: Moderate to high.

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	B	B	
Burning	B	B	B

REVEGETATION: Moderately rapid.

STOCKABILITY: BUDWORM SUSCEPTIBILITY: 1.5

TSI: Sometimes needed to reduce stocking in thickets.

PRODUCTIVITY: 20 /\ 100

Site Index N = 11

Forage Value Rating (Cattle): Early Seral H Late Seral L

OTHER: Potential for wildlife cover is good if proportion of Douglas-fir in stand is high. Good forage potential and summer range for elk.

Pseudotsuga menziesii/Muhlenbergia montana

Douglas-fir/Mountain muhly
PSME/MUMO

Pinus edulis phase 012340
Pinus flexilis phase 012341

SYN:

SITE: Steep s- or w-upper slopes, 8,700-9,700 ft. to northerly lower slopes 7,500-8,000 ft.; very dry soils (low water holding capacity), often very cobbly/gravelly or shallow; Typic or Lithic Dystochrepts (higher elevations), Typic or Lithic Ustochrepts (lower elevations); verify on-site soils.

TES: 5, 0 (PIED phase) to 6, -1 (PIFL phase).

TREES: (by phase)

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	D	G
	A	N	U	R	O	E	L	R	O	D	C	E	A
Pinus edulis						c	a		C	c	c	c	s
Pinus flexilis					a	C	c		C	s	s		s

*c- and sw-NM.

SHRUBS: Usually poorly represented. Quercus gambelii, Ceanothus fendleri, Holodiscus dumosus, Ribes cereum, Cercocarpus montana.

HERBS: Well represented. Blepharoneuron tricholepis, Bromus spp., Carex spp., Koeleria macrantha, Poa fendleriana, Muhlenbergia montana, Sitanion hystrix, Lithospermum multiflorum, Erigeron platyphyllus, Geranium caespitosum.

DIS: sw- and c-NM to n-NM; local in se-AZ.

ALSO SEE: TES mapping unit 202, Cimarron Mts. NM (Edwards 1987); PSME/MUMO in Fitzhugh et al (1987); Pseudotsuga menziesii/Carex rossii (Hess and Alexander 1980) in CO.

COMMENTS: Steep slopes and low site productivity for trees usually precludes timber management; good environment for deer.

Pseudotsuga menziesii/Physocarpus monogynus

35

Douglas-fir/Ninebark
PSME/PHMO

012130

SYN:

SITE: Very steep slopes with gravelly or cobbly, excessively drained soils, 7,000-9,500 ft.; limited topographic sites in landscape.

TES: 6, -1.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	Q
B	I	I	O	B	S	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	G
A	N	U	R	O	E	L	R	O	D	C	O	A
				a	C	s	s	s	a			

SHRUBS: Well represented to abundant. *Acer glabrum*, *Physocarpus monogynus*, *Quercus gambelii*, *Pachistma myrsinites*, *Berberis repens*, *Rosa* spp., *Holodiscus dumosus*, *Jamesia americana*, *Prunus virginiana*, *Symphoricarpos oreophilus*.

HERBS: Well represented. *Solidago* spp., *Geranium richardsonii*, *Bromus ciliatus*, *Smilacina stellata*, *Muhlenbergia montana*, *Poa fendleriana*

DIS: c-NM (San Mateo Mts.) into CO.

ALSO SEE: *Pseudotsuga menziesii*/*Jamesia americana* (Hess and Alexander 1986) and *Pseudotsuga menziesii*/*Symphoricarpos oreophilus* (Johnston 1984) are perhaps indistinguishable. PSME/BERE has weaker expression of herbs and shrubs, but intergrades to PSME/PHMO. If soils are fragmental (> 90 percent gravels and cobbles), see scree forests.

COMMENTS:

Pseudotsuga menziesii/Quercus gambelii

Douglas-fir/Gambel oak
PSME/QUGA

QUGA phase 012140
FEAR phase 012141
MUVI phase 012142

SYN:

SITE: Numerous slopes, aspects, and landforms 6,900-8,000 ft.; often on restricted topography within Abies concolor zone (e.g. s-slopes) or within Pinus ponderosa zone (e.g. n-slopes).

TES: 6, -1 HSC, LSC.

TREES: (by phase)

	A	P	P	P	A	P	P	P	Q	P	J	J	J
	B	I	I	O	B	S	I	I	U	I	U	U	U
	L	E	P	T	C	M	S	P	G	E	S	D	M
	A	N	U	R	O	E	T	O	A	D	C	E	O
QUGA, FEAR, MUVI phases					a	C	s	S	S	s			

SHRUBS: (Including shrubby forms of Gambel oak) Well represented to luxuriant. *Quercus gambelii**, *Robinia neomexicana*, *Symphoricarpos oreophila*, *Pachistima myrsinites*, *Berberis repens*, *Rosa* spp., *Holodiscus discolor*, *Ceanothus fendleri*.

HERBS: Well represented to abundant. *Poa fendleriana*, *Koeleria macrantha*, *Carex rossii*, *Festuca arizonica* (> 5 percent cover in FEAR phase), *Muhlenbergia virescens* (> 5 percent cover in MUVI phase), *Thalictrum fendleri*, *Vicia americana*, *Lathyrus arizonica*, *Achillea millefolium*.

DIS: Widespread in NM, AZ, s-CO, UT.

ALSO SEE: If *Quercus gambelii* < 5 percent cover, see PSME/FEAR. If herbaceous cover < 5 percent see PSME/BERE.

COMMENTS:

H. T.: Douglas-fir/Gambel oak

REGENERATION METHODS:

Clearcut: Favors oak over conifers.

Shelterwood: Usually successful if enough shade remains to help suppress oaks.

Seed Tree: Seldom successful.

Selection: Favors Douglas-fir.

PLANTING:

Recommended Species: Ponderosa pine, Douglas-fir, Southwestern White pine.

Success Probability: Moderate

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	B	B	
Burning	H	H	H

REVEGETATION: Usually rapid.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 1.5

TSI: Sometimes needed to reduce oak competition.

PRODUCTIVITY: 20 /\ 100

Site Index $\frac{61 + 8}{\text{PIPO}}$ $\frac{52 + 8}{\text{PSME}}$ N = 12

Resource Value Rating (Cattle): Early Seral L-M Late Seral L-none

OTHER: Good potential for wildlife food and cover.

Pinus ponderosa/Artemisia arbuscula

37

Ponderosa pine/Low sagebrush
PIPO/ARARN

011380

SYN: Pinus ponderosa/Artemisia nova h.t. (Youngblood and Mauk 1985).

SITE: Elevations around 8,200 ft., elevated basaltic plains.

TES: 5, -1.

TREES:

A	P	P	P	A	P	P	P	Q	P	J	J	J
B	I	I	O	B	S	I	I	U	I	U	U	U
L	E	P	T	C	M	S	P	G	E	S	D	M
A	N	U	R	O	E	T	O	A	D	C	E	O
							C	s	C	C		

SHRUBS: Abundant. Artemisia arbuscula*, A. tridentata, Quercus gambelii, Ribes cercum, Symphoricarpos oreophilus.

HERBS: Well represented. Poa fendleriana, Koeleria macrantha, Carex spp., Bouteloua gracilis, Sitanion hystrix, Erigeron flagellaris, Muhlenbergia montana.

CRYPTOGAMS:

DIS: n-NM, n-AZ, s-UT, s-CO.

ALSO SEE: PIPO/BOGR, ARTR phase is perhaps environmentally indistishable under present knowlegde; compare also with PIPO/BOGR, PIED phase described by Hanks et al (1983).

H. T.: Ponderosa pine/Dwarf sage

REGENERATION METHODS:

Clearcut: Not usually successful.

Shelterwood: Sometimes successful.

Seed Tree: Not usually successful.

Selection: Sometimes successful.

PLANTING:

Recommended Species: Ponderosa pine.

Success Probability: Low

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	H	
Burning	H	H	

REVEGETATION: After disturbance, moderate to slow.

STOCKABILITY: 0.6

BUDWORM SUSCEPTIBILITY: 0

TSI: Sometimes needed to reduce competition from Pinyon and Juniper.

PRODUCTIVITY: (No data)

Site Index _____ Productivity Low

Forage Value Rating (Cattle): Early Seral Low Late Seral None

OTHER: Good potential for fuelwood production. Minor habitat type. Good winter range for elk.

Pinus ponderosa/Arctostaphylos uva-ursi

38

Ponderosa pine/Kinnikinnik
PIPO/ARUV

011400

SYN:

SITE: Shallow soils of ridgetops, stony or excessively drained soils on other slopes, 7,800-9,000 ft.

TES: 5, 0

TREES:

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
						a			C	a			

SHRUBS: Abundant. *Arctostaphylos uva-ursi**, *Quercus gambelii*, *Cercocarpus montanus*, *Ceanothus fendleri*, *Ribes cereum*.

HERBS: Well represented. *Muhlenbergia montana*, *Poa fendleriana*, *Koeleria macrantha*, *Festuca arizonica*, *Carex* spp., *Erigeron formosissimus*, *Potentilla hippiana*, *Antennaria rosea*.

DIS: n-NM and s-CO.

ALSO SEE:

H. T.: Ponderosa pine/Kinnikinnik

REGENERATION METHODS:

Clearcut: Not usually successful.
Shelterwood: Usually successful.
Seed Tree: Sometimes successful.
Selection: Usually successful.

PLANTING:

Recommended Species: Ponderosa pine.
Success Probability: Moderate

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical		B	
Burning		B	

REVEGETATION: After disturbance, moderate.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 0

TSI: Sometimes needed to reduce stocking.

PRODUCTIVITY: PIPO

Site Index 57 + 10 _____ Productivity M-L

Forage Value Rating (Cattle): Early Seral Low Late Seral None

OTHER: Can provide good forage for deer and turkey. Natural fires are frequent in this habitat type.

Pinus ponderosa/Bouteloua gracilis

Ponderosa pine/Blue grama
PIPO/BOGR

Bouteloua gracilis phase 011030
Andropogon scoparium phase 011031
Andropogon hallii phase 011032
Artemisia tridentata phase 011033
Quercus gambelii phase 011035

SITE: 6,300-7,500 ft. (AZ) or 8,500 ft. (NM); topography and soil highly variable; MAP = 19 in/yr; driest, warmest margins of ponderosa pine forest.

TES: 5, -1 LSC, HSC.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	J	Q
B	I	I	O	B	S	I	I	I	I	U	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	O	G
A	N	U	R	O	E	L	R	O	D	C	O	S	A
										C	C	c	c
													s

SHRUBS: Poorly represented. *Quercus gambelii* (QUGA phase), *Artemisia tridentata* (ARTR phase), *Purshia tridentata* (ARTR phase), *Chrysothamnus nauseosus*, *Gutierrezia sarothrae*, *Ribes cereum*, *Rhus trilobata*, *Hymenoxys richardsonii*, *Fallugia paradoxa* (ANHA phase).

HERBS: Well represented especially grasses. *Bouteloua gracilis*, *Poa fendleriana*, *Stipa* spp., *Andropogon scoparium* (ANSC phase), *A. hallii* (cinder soils), *Muhlenbergia montana*, *Sitanion hystrix*, *Blepharoneuron tricholepis*, *Koeleria macrantha*, *Aristida fendleriana*, *A. arizonica*, *Eriogonum racemosum*, *Lotus wrightii*, *Antennaria* spp., *Artemisia ludoviciana*, *Erigeron flagellaris*, *Senecio neomexicanus*, *Geranium caespitosum*.

DIS: Widespread in NM, AZ, CO, s-UT.

ALSO SEE: *Pinus ponderosa*/*Muhlenbergia montana* in s-UT (Youngblood and Mauk 1985); *Pinus ponderosa*/*Bouteloua gracilis*, *Pinus edulis* phase (Hanks *et al* 1983); TES mapping unit 162 for Carson NF (Edwards 1987); *Pinus ponderosa*/*Purshia tridentata* in s-CO (Johnston 1984).

COMMENTS: *Bouteloua gracilis* and shrubs increase on overgrazed livestock ranges. *Fallugia paradoxa* can dominate on deep, cinder soils.

H. T.: Ponderosa pine/Blue grama

REGENERATION METHODS:

- Clearcut: Is usually unsuccessful.
Shelterwood: Is often the best method.
Seed Tree: Is not usually successful.
Selection: Is usually successful.

PLANTING:

- Recommended Species: Ponderosa pine.
Success Probability: Low to moderate.

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	B	B	B
Burning		B	

REVEGETATION: Slow; sites may have high soil erosion potential.

STOCKABILITY: 0.8 BUDWORM SUSCEPTIBILITY: 0

TSI: Sometimes needed to reduce stocking.

PRODUCTIVITY: 20 /\ 100

Site Index $\frac{60 + 18}{\text{PIPO}}$ _____ N = 6

Forage Value Rating (Cattle): Early Seral H Late Seral M

OTHER: Large ponderosa pine may be important turkey roosts. Junipers may be important mid-seral dominants on some sites. Gambel oak, when present, offers mast and cover for wildlife. Fuel wood potential is often high.

Pinus ponderosa/Cowania mexicana

40

Ponderosa pine/Cliffrose
PIPO/COME

011320

SYN: *Pinus ponderosa/Cowania mexicana* community type (Hanks et al 1983).

SITE: Rough, rocky topography at warmer limits of ponderosa pine forests, 6,700-7,400 ft., usually calcareous soils; MAP 19-20 in/yr.

TES: 5, -1, LSC, HSC.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	J	Q
B	I	I	O	B	S	I	I	I	I	U	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	O	G
A	N	U	R	O	E	L	R	O	D	C	O	S	A
					c			C	C	c		C	s

SHRUBS: Well represented. *Cowania stansburiana* var *mexicana**, *Purshia tridentata* (Zuni Mts., NM), *Quercus gambelii*, *Rhus trilobata*, *Yucca baccata*, *Y. glauca*, *Berberis repens*.

HERBS: Well represented. *Muhlenbergia montana*, *Aristida arizonica*, *Poa fendleriana*, *Blepharoneuron tricholepis*, *Andropogon scoparius*, *Sitanion hystrix*, *Bouteloua gracilis*, *Eriogonum racemosum*, *Chaenactis douglasii*, *Lotus wrightii*, *Solidago* spp., *Tradescantia pinetorum*, *Chrysopsis villosa*.

DIS: c- and n-AZ, local in c- and n-NM (Zuni Mts., Jicarilla Apache Reservation); UT, CO, WY, ID.

ALSO SEE: *Pinus ponderosa/Purshia tridentata* (Johnston 1984, Youngblood and Mauk 1985).

COMMENTS: For hybridization between Cowania and Purshia see McArthur et al (1983).

H. T.: Ponderosa pine/Cliffrose

REGENERATION METHODS:

- Clearcut: Not usually successful.
- Shelterwood: Usually successful.
- Seed Tree: Not usually successful.
- Selection: Usually successful.

PLANTING:

- Recommended Species: Ponderosa pine.
- Success Probability: Low

SITE PREPARATION

<u>Method</u>	<u>INTENSITY</u>		
	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	H	B
Burning	H	B	B

REVEGETATION:

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 0

TSI: Occasionally needed.

PRODUCTIVITY:

Site Index _____ Productivity Low

Resource Value Rating (Cattle): Early Seral Low Late Seral Low

OTHER: Important browse producer for wintering big game. Has good potential for firewood production.

Pinus ponderosa/Festuca arizonica

Ponderosa pine/Arizona fescue
PIPO/FEAR

FEAR phase 011090
DAPA phase 011091
BOGR phase 011092
QUGA phase 011093

SYN:

SITE: Elevated and valley plains, piedmont hillslopes and mountain slopes, 7,200-8,800 ft. (to 9,400 ft. on s-slopes); MAP 20-25 in/yr.

TES: 5, 0 (5, +1 DAPA phase).

TREES: (by phase)

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
Danthonia parryi phase				s	a	c			C		s		
Festuca arizonica phase						a			C	a	a		
Quercus gambelii phase									C	s	a	a	s
Bouteloua gracilis phase									C	s	s	s	

SHRUBS: Scarce. Quercus gambelii (QUGA phase), Ribes cereum, Ceanothos fendleri, Cercocarpus montana, Gutierrezia sarothrae (BOGR phase).

HERBS: Well represented to abundant. Festuca arizonica*, Muhlenbergia montana, Bouteloua gracilis (< 2 percent cover in BOGR phase), Stipa pringlei, Danthonia parryi (DAPA phase), Koeleria macrantha, Blepharoneuron tricholepis, Carex rossii, Sitanion hystrix, Lithospermum multiflorum, Antennaria spp., Potentilla hippiana, Heterotheca fulcrata, Artemisia ludoviciana, A. carruthii, Pteridium aquilinum, Poa pratensis.

DIS: Widespread in NM, c-AZ, s-CO; infrequent s of the Rim.

ALSO SEE: Pinus ponderosa/Muhlenbergia montana on the north Kaibab plateau is very similar but lacks Festuca arizonica; Pinus ponderosa/Poa longiligula community type (Hanks et al 1983); Currie (1975); Pearson (1950). The Danthonia parryi phase very closely resembles ABCO/FEAR.

COMMENTS: Poa pratensis or Pteridium aquilinum can dominate where fires or livestock grazing have had past or repeated occurrences.

H. T.: Ponderosa pine/Arizona fescue

REGENERATION METHODS:

Clearcut: Is sometimes needed in heavy mistletoe infected stands.

Shelterwood: Almost always successful. Regeneration is often very abundant, forming thickets or dense patches.

Seed Tree: Is often successful.

Selection: Favors ponderosa pine in mistletoe free stands.

PLANTING:

Recommended Species: Ponderosa pine.

Success Probability: High

SITE PREPARATION

<u>Method</u>	<u>INTENSITY</u>		
	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	B	B	
Burning	B	B	

REVEGETATION: Moderately rapid.

STOCKABILITY: 1 BUDWORM SUSCEPTIBILITY: 0

TSI: Usually needed to reduce stocking. Regeneration of pine tends to form dense thickets when conditions are favorable.

PRODUCTIVITY: 20 _____ / \ _____ 100

Site Index $\frac{58 + 13}{\text{PIPO}}$ _____ N = _____ 25

Forage Value Rating (Cattle): Early Seral High Late Seral M-L

OTHER: Open stands with grassy understories are "parklike" and attractive to recreationists. Poor potential for hiding cover except where pine thickets exist. Burning can stimulate Ceanothus fendleri (an important browse species) on some sites. Prescribed fire can also be used to reduce pine thickets and maintain parklike views.

Pinus ponderosa/Muhlenbergia montana

42

Ponderosa pine/Mountain muhly
PIPO/MUMO

011330

SYN: *Pinus ponderosa*/Poa longiliqula community type (Hanks et al 1983).

SITE: Gentle and moderate slopes, 7,500-8,500 ft.; MAP 22-23 in/yr. Precipitation at Jacob Lake AZ (7920 ft) is 18.5 in/yr, about 60% of which occurs from October through March.

TES: 5, 0.

TREES:
(by geography)

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
North Kaibab Plateau				a		a			C	a			
Elsewhere				a		a			C	c	c	c	s

SHRUBS: Common. *Ceanothus fendleri*, *Quercus gambelii*, *Cercocarpus montanus*, *Berberis repens*, *Hymenoxys richardsonii*.

HERBS: Well represented to abundant, especially grasses. *Muhlenbergia montana*, *Blepharoneuron tricholepis*, *Poa fendleriana*, *Koeleria macrantha*, *Carex* spp., *Sitanion hystrix*, *Bouteloua gracilis* (usually scarce), *Andropogon* spp., *Lotus wrightii*, *Lithospermum multiflorum*, *Senecio neomexicanus*, *S. multilobatus*, *Erigeron flagellaris*, *Geranium caespitosum*, *Antennaria* spp, *Achillea millefolium*.

CRYPTOGAMS:

DIS: sw- and c-NM to CO; c-AZ to s-UT.

ALSO SEE: *Pinus ponderosa*/*Festuca arizonica* is distinguished by *Festuca arizonica* common. PIPO/MUMO described by Hess and Alexander (1986) and Youngblood and Mauk (1985) may be geographic phases. Certain stands classified as PIPO/BOGR, *Bouteloua gracilis* phase by Hanks et al (1983) are assigned here to PIPO/MUMO if *Bouteloua gracilis* < 5% cover.

COMMENTS: Seral stages of PIPO/FEAR, especially on livestock allotments (pine-bunchgrass range) can resemble PIPO/MUMO. Heavily grazed lands of PIPO/MUMO can also resemble PIPO/BOGR.

H. T.: Ponderosa pine/Mountain muhly

REGENERATION METHODS:

- Clearcut: Sometimes successful and needed in mistletoe infected stands.
Shelterwood: Usually successful for ponderosa pine.
Seed Tree: Is often successful for ponderosa pine.
Selection: Is usually successful.

PLANTING:

- Recommended Species: Ponderosa pine.
Success Probability: High or moderate.

SITE PREPARATION

<u>Method</u>	<u>INTENSITY</u>		
	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	B	B	B
Burning	B	B	B

REVEGETATION: Usually rapid.

STOCKABILITY: 1

BUDWORM SUSCEPTIBILITY: 0

TSI: Is often necessary, especially where regeneration occurs in dense patches.

PRODUCTIVITY: 20 _____ / \ _____ 100

Site Index $\frac{58 + 13}{\text{PIPO}}$ _____ N = 8

Forage Value Rating (Cattle): Early Seral H Late Seral M

OTHER: Low potential for wildlife hiding cover. Burning tends to stimulate germination of Ceanothus fendleri, an important browse species. Stands can have high visual quality where large pines occur in clumped mosaics over grassy understories. Prescribed fires can be useful to reduce conifer thickets, maintain visual quality, and stimulate herbage production.

Pinus ponderosa/Oryzopsis hymenoides

43

Ponderosa pine/Indian ricegrass
PIPO/ORHY

011350

SYN:

SITE: Deep sandy soils, 6,000-6,300 ft.

TES: 5, -1.

TREES:
(very open stands)

A	P	P	P	A	P	P	P	P	P	J	J	Q
B	I	I	O	B	S	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	G
A	N	U	R	O	E	L	R	O	D	C	O	A
								C			C	

SHRUBS: Common. *Poliomintha incana**, *Cercocarpus montanus*.

HERBS: Common. *Oryzopsis hymenoides*, *Schizachyrium scoparium*, *Sitanium hystrix*, *Chrysopsis villosa*, *Sporobolus contractus*, *Andropogon hallii*, *Muhlenbergia pungens*.

DIS: Very local in n-NM (Espanola Ranger District, Carson NF).

ALSO SEE:

COMMENTS:

H. T.: Ponderosa pine/Indian ricegrass

REGENERATION METHODS:

Clearcut: Not usually successful, can destabilize sandy soil.

Shelterwood: Sometimes successful.

Seed Tree: Not usually successful.

Selection: Sometimes successful.

PLANTING:

Recommended Species: Ponderosa pine.

Success Probability: Low

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	H	
Burning	H	H	

REVEGETATION: After disturbance, slow to very slow.

STOCKABILITY: 0.6

BUDWORM SUSCEPTIBILITY: 0

TSI: Not needed.

PRODUCTIVITY:

Site Index ? + + + Productivity Low

Forage Value Rating (Cattle): Early Seral Low Late Seral Low

OTHER: Rare in occurrence, heavy disturbance can cause return to sand dune conditions.

Pinus ponderosa/Quercus gambellii

44

Ponderosa pine/Gambel oak
PIPO/QUGA

Quercus gambellii phase 011210
Festuca arizonica phase 011211
Pinus edulis phase 011213
Muhlenbergia montana ph. 011214

SYN:

SITE: 6,300-9,200 ft. on wide variety of slopes, landforms, and soils.

TES: 5, 0; 5, -1 (PIED phase).

TREES: (by phase)

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
QUGA and FEAR						a			C	a	c		S
PIED						a			C	C	c	c	S

SHRUBS: Abundant. *Quercus gambellii* (shrubby forms), *Symphoricarpos oreophilus*, *Rosa* spp., *Cercocarpus montanus*, *Berberis repens*, *Ceanothus fendleri*, *Yucca glauca*.

HERBS: Well represented. *Poa fendleriana*, *Carex rossii*, *Bromus ciliatus*, *Muhlenbergia montana*, *Festuca arizonica* (common in FEAR phase), *Schizachyrium scoparium*, *Koeleria macrantha*, *Achillea millefolium*, *Artemisia ludoviciana*, *Chrysopsis villosa*, *Vicia americana*.

CRYPTOGAMS:

DIS: Widespread in NM, AZ, CO, UT.

ALSO SEE: In Arizona gambel oak can assume a midstory tree form with herbs beneath. This has been described as gambel oak phases of PIPO/FEAR and PIPO/BOGR by Hanks *et al* (1983). The FEAR and MUMO phases of PIPO/QUGA typically consist of mosaics of oak and grasses in patchy distribution.

COMMENTS:

H. T.: Ponderosa pine/Gamble oak

REGENERATION METHODS:

Clearcut: Strongly favors oak over pine.

Shelterwood: Usually successful, favors pine if enough shelter is retained to partially suppress the oak.

Seed Tree: Favors oak over pine.

Selection: Usually successful, favors pine over oak.

PLANTING:

Recommended Species: Ponderosa pine.

Success Probability: High with good site preparation.

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	B	B	B
Burning	H	H	H

REVEGETATION:

STOCKABILITY: 1.0

BUDWORM SUSCEPTIBILITY: 0

TSI: Often needed to release pine from oak competition.

PRODUCTIVITY:

Site Index PIPO 47 _____ _____ _____ Productivity Moderate

Resource Value Rating (Cattle): Early Seral Moderate Late Seral Low

OTHER: Good hiding cover in summer, browse production is often good from shrubs other than oak. Important source of mast for turkeys.

Pinus ponderosa/Quercus undulata

45

Ponderosa pine/Wavyleaf oak
PIPO/QUUN

011370

SYN:

SITE: Hot, dry sites between 6,500-7,500 ft. (s-slopes to 8,000 ft.); MAP 20-21 in/yr with hot, dry May and June.

TES: 5, -1; HSC.

TREES:

	A	P	P	P	A	P	P	P	Q	P	J	J	J
	B	I	I	O	B	S	I	I	U	I	U	U	U
	L	E	P	T	C	M	S	P	G	E	S	D	M
	A	N	U	R	O	E	T	O	A	D	C	E	O
								C		S		s	s

SHRUBS: Well represented. *Quercus undulata**, *Rhus trilobata*, *Cercocarpus montana*.

HERBS: Well represented. *Muhlenbergia montana*, *Andropogon gerardi*, *Bouteloua curtipendula*, *B. gracilis*, *Aristida arizonica*, *Lycurus phleoides*, *Schizachyrium scoparium*, *Artemisia ludoviciana*, *Lithospermum multiflorum*, *Geranium caespitosum*, *Chrysopsis villosa*.

DIS: s- and c-NM, local in n-NM.

ALSO SEE: PIPO/QUGA in warmer sites may have minor cover of wavyleaf oak.

COMMENTS:

Pinus ponderosa/Rockland

46

Ponderosa pine/Rockland
PIPO/Rockland

011500

SYN:

SITE: Very shallow (< 10 in.) soil and exposed bedrock comprise about 50-90 percent of the surface; 7,500-8,500 ft.

TES: 5, -1, 0, +1

TREES:

	A	P	P	P	A	P	P	P	Q	P	J	J	J
	B	I	I	O	B	S	I	I	U	I	U	U	U
	L	E	P	T	C	M	S	P	G	E	S	D	M
	A	N	U	R	O	E	T	O	A	D	C	E	O
								C		c		c	c

SHRUBS: Scarce. *Quercus gambelii*, *Cercocarpus montanus*, *Yucca* spp., *Gutierrezia sarothrae*, *Fallugia paradoxa*.

HERBS: Scarce to common. *Muhlenbergia montana*, *Bouteloua curtipendula*, *Bouteloua hirsuta*, *Solidago* spp., *Blepharoneuron tricholepis*, *Schizachyrium scoparium* (*Andropogon scoparius*).

CRYPTOGAMS:

DIS: Local in Zuni Mts., NM, Santa Catalina Mts, AZ, and elsewhere.

ALSO SEE: Malpais rockland described by Lindsey (1951) can be assigned to PIPO/Rockland.

COMMENTS: Ponderosa pine was formerly named *Pinus scopulorum* meaning rock pine.

H. T.: Ponderosa pine/Rockland

REGENERATION METHODS:

Clearcut: Not appropriate.
Shelterwood: Not appropriate.
Seed Tree: Not appropriate.
Selection: Not appropriate.

PLANTING:

Recommended Species: Ponderosa pine.
Success Probability: Very low.

SITE PREPARATION

<u>Method</u>	<u>INTENSITY</u>		
	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	H	H
Burning	H	H	

REVEGETATION: Very slow.

STOCKABILITY: 0.4

BUDWORM SUSCEPTIBILITY: 0

TSI: Not appropriate.

PRODUCTIVITY:

Site Index _____ Productivity Very Low

Forage Value Rating (Cattle): Early Seral None Late Seral None

OTHER: Often attractive with rock outcrops and scattered large trees. Dwarfed pine growing in rock fissures may be hundreds of years old. Pinus ponderosa var. scopulorum means ponderosa pine "of the rocks" or rock pine.

Scree Forests

260000

- SYN:** *Abies lasiocarpa/Saxifraga bronchialis* (DeVelice et al 1986).
Abies lasiocarpa/Holodiscus dumosus (Fitzhugh et al 1986).
Abies concolor/Holodiscus dumosus (DeVelice et al 1986).
Abies concolor/Jamesia americana (Fitzhugh et al 1986).
Pseudotsuga menziesii/Holodiscus dumosus (DeVelice et al 1986,
 Fitzhugh et al 1986).
Pinus ponderosa/Ribes inerme (DeVelice et al 1986).
Abies concolor-Pseudotsuga menziesii/Holodiscus dumosus (Johnston
 1984).
- SITE:** Usually moderate or steep slopes below cliffs; soils are mostly
 cobbles and boulders, these coarse fragments (including stones
 and gravels) comprising > 90 percent of soil volume.
- TES:** All climatic and elevational zones (5, 6, 7,); Entisols (talus,
 scree, rock glaciers, etc.).
- TREES:** Usually open, sparsely stocked stands, composition depends upon
 climate.
- SHRUBS:** Scarce to well represented. *Ribes* spp., *Jamesia americana*,
Holodiscus dumosus, *Salix scouleriana*, *Acer glabrum*.
- HERBS:** Scarce. Variable.
- CRYPTOGAMS:** Well represented to abundant. Lichens on rocks are especially
 conspicuous.
- DIS:** Throughout the Southwest.
- ALSO SEE:** ABCO/ELTR and PIEN/ELTR (both in Capitan Mts. NM), *Pseudotsuga*
menziesii/Paxistima myrsinites (Komarkova 1986), *Pseudotsuga*
menziesii/Jamesia americana (Johnston 1984).
- MANAGEMENT**
IMPLICATIONS: These are generally noncommercial forests. Depending upon
 locality and geography, the scree environment may feature
 special animal populations such as certain lizards, snakes,
 small mammals (chipmunks, pika, etc.).

H. T.: Scree

REGENERATION METHODS:

Clearcut: N/A
Shelterwood: N/A
Seed Tree: N/A
Selection: N/A

PLANTING:

Recommended Species: N/A
Success Probability: N/A

SITE PREPARATION

INTENSITY

<u>Method</u>	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Mechanical	H	H	
Burning	N/A	N/A	N/A

REVEGETATION: After disturbance, very slow.

STOCKABILITY: .5 BUDWORM SUSCEPTIBILITY: 1.5

TSI: Not needed.

PRODUCTIVITY:

Site Index ? + + + Productivity None

Forage Value Rating (Cattle): Early Seral None Late Seral None

OTHER: Occasionally large trees are produced that can be attractive or important for wildlife habitat, snags and spiked topped trees are sometimes important for cavity nesters. Scree can be important habitat for certain rodents and herpefauna (lizards, snakes, salamanders).

Riparian Forests

48

Alnus tenuifolia series	123000
Populus angustifolia series	103000
Populus fremontii var wislizenii series	104000

SYN: Subseries descriptions are provided in various TES reports.

Association descriptions include *Picea pungens*/*Cornus stolonifera* (Fitzhugh et al 1987), *Abies concolor*/*Galium triflorum* (DeVelice et al 1986), *Pinus ponderosa*/*Poa pratensis* (DeVelice et al 1986), *Abies concolor*/*Juglans major* (Alexander et al 1984a).

SITE: Perennial and intermittent streamsides, all elevations, Aquic cumulic, and fluventic soils where roots reach water table and its capillary fringe.

TES: All climatic and elevational zones (5, 6, 7).

TREES: Well represented to luxuriant overstories. Any of the following are diagnostic when present. *Populus fremontii*, *P. angustifolia*, *Juglans major*, *Acer negundo*, *Salix gooddingii*, *Fraxinus pennsylvanica* var *velutina*, *Eleagnus angustifolia*.

SHRUBS: Often abundant. Any of the following are diagnostic. *Salix bebbiana*, *Salix exigua*, *S. lasiandra*, *Alnus tenuifolia*, *Cornus stolonifera*, *Salix irrorata*. Other common species can include *Vitis arizonica*, *Parthenocissus inserta*, *Toxicodendron radicans*, *Lonicera involucrata*, *Salix scouleriana*, *Acer glabrum*, *Pachistima myrsinites*.

HERBS: Abundant to luxuriant. There is a highly diverse flora. Common species include *Poa pratensis*, *Bromus* spp., *Rudbeckia laciniata*, *Agrostis gigantea*, *Agropyron smithii*, *Elymus glaucus*, *Heracleum spondylium*, *Oxypolis fendleri*, *Veratrum californicum*, *Geum allepicum*, *Hypericum formosum*.

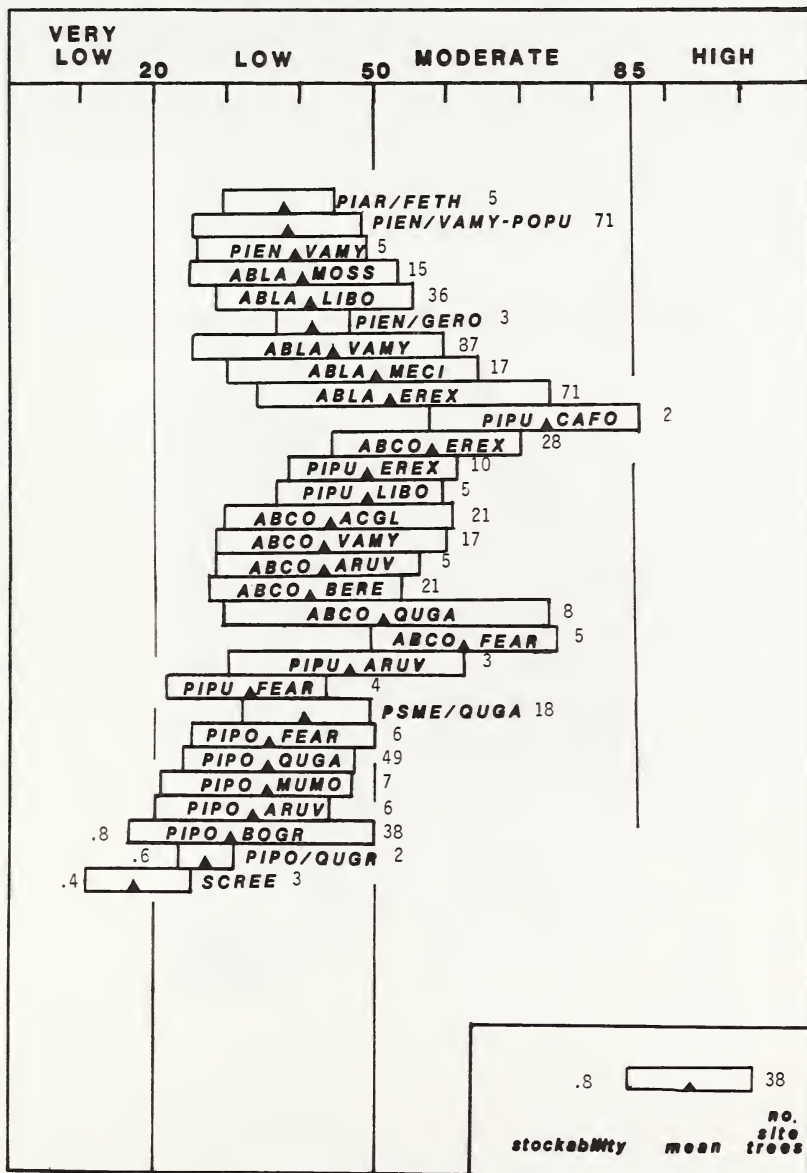
DIS: Widespread throughout Southwest.

ALSO SEE: USDA Forest Service, Region 3, Riparian Area Handbook.

MANAGEMENT

IMPLICATIONS: Riparian forests require special standards and guidelines as stated in Forest Plans and project level prescriptions.

Northern New Mexico Yield Classes





Schizachyrium scoparium (Little bluestem)

WOODLANDS



Scarp Woodland



**Chrysothamnus
nauseosus**

(Rabbitbrush)

Scarp Woodland

1W

250000

- SITE:** Slopes > 40 percent with cobbly, bouldery soils having much discontinuity because of rock outcrop or bare rock exposure.
- TES:** 4; -1, 0, +1.
- TREES:** Well represented. Species composition varies with geography and elevation.
- SHRUBS:** Well represented. Usually numerous species are found. Composition varies with geography and elevation.
- HERBS:** Well represented. Numerous species of both grasses and forbs.
- DIS:** Widespread in Southwest and Great Plains.
- ALSO SEE:** QUGR/CEMO, PIED/CEMO, JUMO/QUTU, JUMO/QUUN, JUDE-JUMO/CEMO-QUGR; Wells (1970); TES mapping units with very steep slopes and rock outcrop components, such as MU 278 (Edwards 1987), MUS 105, 113, 117, 127, 133, 208 (Price 1983), and MU 74 (Gass et al 1981); Naumann (1987) divides scarp woodlands into local plant associations
- COMMENTS:** Steep, rough, topography limit management opportunities to wildlife, visual, and dispersed recreation rather than extractive, commodity-oriented use.

Pinus aristata/Festuca arizonica

2W

Bristlecone pine/Arizona fescue
PIAR/FEAR

238300

SITE: Steep s- or w-slopes, often adjoining grasslands, 8,600-10,500 ft.

TES: 6, 0, +1.

TREES:

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
			c	a		c	c	C					

SHRUBS: Common. *Ribes cereum*, *Symphoricarpos oreophius*, *Juniperus communis*.

HERBS: Abundant. *Festuca arizonica*, *Muhlenbergia montana*, *Koeleria macrantha*, *Erigeron* spp., *Artemisia franserioides*, *Campanula rotundifolia*.

DIS: Local in n-NM and s-CO.

ALSO SEE: TES mapping units 300 and 302 for Carson National Forest (Edwards 1987); PSME/FEAR, *Pinus flexilis* phase occurs on similar sites in the San Francisco Peaks, AZ.

COMMENTS:

H. T.: Bristlecone pine/Arizona fescue

REGENERATION METHODS:

Clearcut: Generally favors meadows.

Shelterwood: Sometimes successful.

Seed Tree: Not usually successful.

Selection: Favors Douglas-fir or blue-spruce.

PLANTING:

Recommended Species: Bristlecone pine, blue-spruce (where appropriate).

Success Probability: Low

SITE PREPARATION:

INTENSITY:

<u>METHOD</u>	<u>HIGH</u>	<u>MODERATE</u>	<u>LOW</u>
Mechanical	H	H	B
Burning	H	H	H

REVEGETATION: After disturbance, moderate to slow.

STOCKABILITY: .8 BUDWORM SUSCEPTIBILITY: 0

TSI: Not usually needed

PRODUCTIVITY:

Site Index ? + + + Productivity Low

Forage Value Rating (Cattle): Early Seral Moderate Late Seral Low

OTHER: Often an interesting and attractive habitat type because of open grassy stands and contrast in tree form between bristlecone pine and Douglas-fir or blue spruce. Cessation of grass fires contributes to tree encroachment into former meadows.

Pinus aristata/Festuca thurberi

3W

Bristlecone pine/Thurber fescue
PIAR/FETH

238310

SITE: Mid and upper slopes, often adjoining grasslands, 10,500-11,800 ft.,
Dystric Cryochrepts, Typic Cryoborolls, Typic Cryorthents.

TES: 7, -1, 0, +1.

TREES:

A	P	P	P	A	P	P	P	P	P	J	J	Q
B	I	I	O	B	S	I	I	I	I	U	U	U
L	E	P	T	C	M	F	A	P	E	S	M	G
A	N	U	R	O	E	L	R	O	D	C	O	A
a	C						C					

SHRUBS: Scarce. *Ribes montigenum*, *R. cereum*, *Symphoricarpos orcophilus*,
Juniperus communis, *Saxifraga bronchialis*.

HERBS: Abundant. *Festuca thurberi**, *F. arizonica*, *Poa fendleriana*,
P. pratensis, *Achillea millefolium*, *Polemonium pulcherrimum*,
Campanula rotundifolia, *Oreochrysum parryi*.

DIS: n-NM, CO.

ALSO SEE: TES mapping unit 303 for Carson National Forest (Edwards 1987).
If *Festuca thurberi* is scarce, see PIAR/FEAR.

COMMENTS:

H. T.: Bristlecone pine/Thurber fescue

REGENERATION METHODS:

Clearcut: Generally favors meadows.

Shelterwood: Often successful for either Engelmann spruce or bristlecone pine.

Seed Tree: Not usually successful.

Selection: Favors Engelmann spruce.

PLANTING:

Recommended Species: Bristlecone pine

Success Probability: Low

SITE PREPARATION:

INTENSITY

<u>METHOD</u>	<u>HIGH</u>	<u>MODERATE</u>	<u>LOW</u>
Mechanical	H	H	B
Burning	H	H	H

REVEGETATION: After disturbance, moderate to slow.

STOCKABILITY: .8

BUDWORM SUSCEPTIBILITY: 0

TSI: Not usually needed.

PRODUCTIVITY:

Site Index ? + + + Productivity Low

Forage Value Rating (Cattle): Early Seral Moderate Late Seral Low

OTHER: Often an interesting and attractive habitat type because of open grassy stands, distinctive form of bristlecone pine, and contrasts in tree form between bristlecone pine and spire-like crowns of Engelmann spruce. Cessation of grass fires contributes to tree encroachment into the meadows.

Pinus aristata/Ribes montigenum

4W

Bristlecone pine/Mountain current
PIAR/RIMO

238040

SITE: Scree and cobbly soils, 10,500-11,500 ft., ridgetops and dry, exposed sites.

TES: 7, 0, +1.

TREES:

	A	P	P	P	A	P	P	P	P	P	J	J	Q
	B	I	I	O	B	S	I	I	I	I	U	U	U
	L	E	P	T	C	M	F	A	P	E	S	M	G
	A	N	U	R	O	E	L	R	O	D	C	O	A
		c					c	C					

SHRUBS: Well represented. *Ribes montigenum*, *Saxifraga bronchialis*, *Juniperus communis*.

HERBS: Scarce. *Penstemon whippleanus*, *Festuca brachyphylla*, *Thlaspi fendleri*, *Senecio atratus*, *Trifolium dasyphyllum*.

DIS: n-AZ, UT, n-NM, CO.

ALSO SEE: Scree forest (DeVelice et al 1986), Rominger and Paulik (1983), *Pinus aristata*/*Trifolium dasyphyllum* h.t. (Hess and Alexander 1986).

MGT: Stands have scenic appeal, and old trees record past climatic variables as tree-ring widths.

COMMENTS:

Pinus edulis/Andropogon hallii

5W

Pinyon pine/Sand bluestem
PIED/ANHA

204300

SITE: Valley plains with deep, sandy soils (Typic Ustipsamments).

TES: 4, -1 HSC, LSC.

TREES: Well represented. *Pinus edulis* and *Juniperus monosperma*.

SHRUBS: Often well represented. *Artemisia filifolia*, *Artemisia tridentata* (LSC climate), *Yucca elata*, *Rhus trilobata*, *Chrysothamnus* spp.

HERBS: Well represented. *Andropogon hallii**, *Muhlenbergia pungens**, *Andropogon scoparium* (*Schizachyrium scoparium*), *Bouteloua gracilis*, *Sporobolus cryptandrus*, *Sporobolus contractus*, *Erysimum repandum*, *Oryzopsis hymenoides*.

DIS: Local in c- and n-NM.

ALSO SEE: TES mapping unit 153 in the Carson National Forest (Edwards 1987).

COMMENTS:

Pinus edulis/Arctostaphylos pungens

6W

Pinyon pine/Manzanita
PIED/ARPU

204400

SITE: Steep slopes of canyon walls, elevated plains, and benches, 5,000-8,000 feet; stony soils derived from limestone or sandstone.

TES: 4, 0 LSM.

TREES: Well represented. *Pinus edulis*, *Juniperus osteosperma*.

SHRUBS: Abundant. *Arctostaphylos uva-ursi**, *Quercus turbinella*, *Garrya flavescens*, *Artemisia tridentata*, *Glossopetalon nevadense*, *Cercocarpus montanus*, *Gutierrezia sarothrae*, *Yucca baccata*, *Rhus trilobata*, *Agave utahenses*.

HERBS: Scarce to common.

DIS: Grand Canyon National Park north of Colorado River from Shivwits Plateau to Naukoveap Valley.

ALSO SEE: *Pinus fallax*/*Arctostaphylos pungens* (USDA Forest Service 1986b); *Pinus edulis*-*Quercus turbinella*-*Arctostaphylos pungens* association (Warren et al 1982).

COMMENTS:

Pinus edulis/Artemisia tridentata

7W

Pinyon pine/Big sage
PIED/ARTR

Juniperus osteosperma phase 204010
Juniperus monosperma phase 204011
Juniperus scopulorum phase 204012

SYN: *Pinus edulis*-*Juniperus osteosperma*/*Artemisia tridentata*
(Johnston 1984)

SITE: MAP = 16 in/yr (Erdman et al 1969); highly variable soils and
topography between 6000-7400 ft.

TES: 4, 0 LSC.

TREES: Well represented. *Pinus edulis* in association with junipers,
depending on geography.

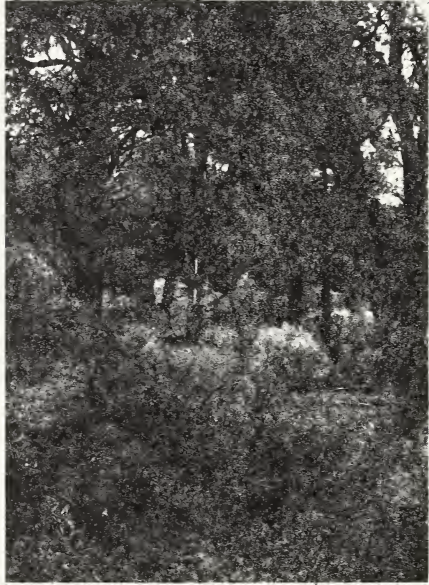
SHRUBS: Common to abundant. *Artemisia tridentata**, *Atriplex canescens*,
Lycium pallidum, *Yucca baccata*, *Chrysothamnus nauseosus*,
C. depressus, *Ephedra viridis*, *Gutierrezia sarothrae*, *Opuntia*
whippleanus, *O. polyacantha*.

HERBS: Well represented. *Poa fendleriana*, *Koeleria macrantha*, *Sitanion*
hystrix, *Stipa comata*, *S. neomexicana*, *S. speciosa*, *Oryzopsis*
micrantha, *O. hymenoides*, *Agropyron smithii*, *Muhlenbergia torreyi*,
Hilaria jamesii, *Bouteloua gracilis*, *Phlox* spp. Annual grasses,
mostly of the genus *Bromus*, are common on grazed sites or disturbed
soil.

DIS: JUOS phase from sw-CO and s-UT into n-AZ and nc-NM; JUMO and JUSC
phases from nc-NM into s-CO.

ALSO SEE: Erdman (1970); Erdman, Douglas, and Marr (1969); Jameson et al
(1962), Schmutz et al (1967); TES mapping units 142, 145, 151, 153,
and 194 on Carson National Forest (Edwards 1987); TES mapping
units 206, 207, 220, 214, and 643 on Santa Fe NF (Gass et al 1981,
Price 1983); *Juniperus osteosperma*-*Pinus edulis*-*Artemisia tridentata*
association (Warren et al 1982).

COMMENTS: Succession has been described by Erdman (1970).



Pinyon pine/Big sage

Habitat Type (7W)

Pinus edulis/Bouteloua gracilis

8W

Pinyon pine/Blue grama	Hill slope phase	204024
PIED/BOGR	Juniperus osteosperma phase	204021
	Juniperus monosperma phase	204022

SITE: Valley and elevated plains, piedmont slopes, mountain slopes; 6300-7500 ft (lower or higher depending on aspect and soils); wide variety of soil and parent materials; MAP = 15-18 in/yr. The hill slope phase usually occurs on slopes > 15 percent.

TES: 4, 0, +1 (mostly HSC)

TREES: Abundant to luxuriant. *Pinus edulis*, *Juniperus monosperma*, *Juniperus osteosperma*.

SHRUBS: Scarce to common. *Rhus trilobata*, *Cercocarpus montanus*, *Gutierrezia sarothrae*, *Chrysothamnus*, *Quercus undulata*, *Opuntia imbricata*, *O. polyacantha*, *O. phaeacantha*, *Cowania mexicana* (<1-2 percent cover), *Artemisia tridentata* (<1 percent cover), *Yucca elata*, *Lycium pallidum*.

HERBS: Abundant, especially grasses. *Bouteloua gracilis*, *B. curtipendula*, *B. eriopoda*, *Hilaria jamesii*, *Oryzopsis micrantha*, *Poa fendleriana*, *Koeleria macrantha*, *Sitanion hystrix*, *Stipa* spp., *Muhlenbergia torreyi*, *Artemisia frigida*, *Lycurus phleoides*, *Aristida* spp., *Schizachyrium scoparium*, *Agropyron smithii*.

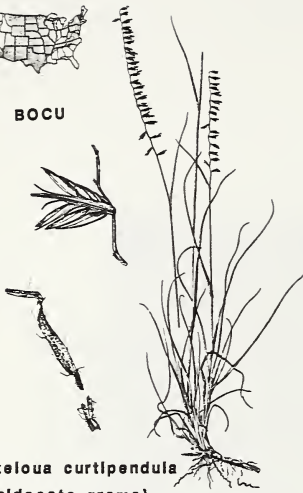
DIS: Widespread in NM, AZ, s-CO, s-UT.

ALSO SEE: *Pinus edulis*-*Juniperus monosperma*/*Bouteloua gracilis* (Kennedy 1983), *Pinus edulis*-*Juniperus deppeana*/*Bouteloua gracilis* (Kennedy 1983), Dick-Peddie *et al* 1984, Francis (1986). Mapping units 118, 159, and 195 (hill slope phase) of Edwards (1987); hill slope phases on the Coyote RD (Santa Fe NF) can be found in TES mapping units 143, 215, and 216 (Price 1983). See Barnes (1987) for comparisons between PIED/BOGR, PIED/POFE, and JUMO/BOCU near Los Alamos, NM. The hill-slope phase grades into JUMO/BOCU or JUMO/BOGR on drier, warmer sites.

PIED/POFE (14W) may key to PIED/BOGR. However PIED/BOGR has scarce *Muhlenbergia montana*, and cool season grasses are less frequent.



BOCU



Bouteloua curtipendula
(sideoats grama)



**FRINGED
SAGE**



Artemisia frigida



Schizachyrium scoparium (Little bluestem)

Pinus edulis/Cowania mexicana

9W

Pinyon pine/Cliffrose
PIED/COME

COME phase 204320
ARTR phase 204321

SITE: Plains or hill slopes, 6,000-6,800 ft., often Lithic Haplustolls or Lithic Ustochrepts on calcareous parent materials; MAP 14-16 in.

TES: 4, 0 HSC (COME phase); 4,0 LSC (ARTR phase)

TREES: Well represented. *Pinus edulis*, *Juniperus osteosperma*.

SHRUBS: Well represented. *Cowania mexicana**, *Chamaebatiaria millefolium*, *Quercus gambelii*, *Berberis trifoliata*, *Cercocarpus montanus*, *Yucca baccata*, *Artemisia tridentata* (ARTR phase), *Ephedra viridis*, *Opuntia* spp.

HERBS: Well represented. *Bouteloua gracilis*, *B. curtipendula*, *Stipa comata*, *S. neomexicana*, *Andropogon scoparius*, *Poa fendleriana*, *Koeleria macrantha*, *Sitanion hystrix*, *Polygala alba*, *Penstemon linarioides*, *Artemisia frigida*, *A. ludoviciana*, *Calliandra humilis*.

DIS: c- and n-AZ into UT and sw-CO; local in w-NM.

ALSO SEE: PIED/BOGR if shrubs are poorly represented; PIED/QUGA if *Quercus gambelii* > 5 percent cover; mapping unit 52 in Nelson and Redders (1982); *Pinus edulis*-*Juniperus osteosperma*-*Artemisia tridentata*-*Cowania mexicana* association (Warren et al 1982)

COMMENTS: For taxonomy and hybridization of *Cowania*, see McArthur et al (1983)

Pinus edulis/Coleogyne ramosissima

10W

Pinyon pine/Blackbrush
PIED/CORA

204410

SITE: Elevated plains and benches, 3,500-6,200 ft.; usually shallow (lithic), stony soils developed from a wide variety of parent materials.

TES: 4, 0, LSC.

TREES: Well represented. *Pinus edulis*, *Juniperus Osteosperma*.

SHRUBS: Well represented or abundant. *Coleogyne ramosissima**, *Mortonia scabrella**, *Glossopetalon nevadense*, *Cercocarpus montana*, *Quercus turbinella*, *Gutierrezia sarothrae*, *Atriplex canescens*, *Cowania stansburiana* (McArthur et al 1983), *Thamnosma montana*, *Agave utahensis*, *Yucca baccata*.

HERBS: Common. *Stipa speciosa*, *Sitanion hystrix*, *Poa fendleriana*, *Koeleria macrantha*, *Agropyron smithii*, *Bouteloua curtipendula*, *B. eriopoda*, *Aristida* spp., *Bromus rubens*, *Psilotrophe sparsiflora*.

DIS: Grand Canyon National Park, AZ.

ALSO SEE: *Coleogyne ramosissima*-*Pinus edulis*-*Juniperus osteosperma* and *Mortonia scabrella*-*Pinus edulis*-*Gutierrezia* associations of Warren et al (1982).

COMMENTS:

**Pinus edulis/Chrysothamnus
nauseosus - Fallugia paradoxa**

11W

Pinyon pine/Rabbitbrush-Apache plume; PIED/CHNA-FAPA

204330

- SITE:** Intermittent washes and river terraces, 6,300-7,500 ft.; common soils include Typic Ustifluvents, Fluventic Haplustolls, and Fluventic Ustochrepts. These are often incised with arroyos or gullies. Also found on deep cindery soils. Site specific determination of soils may be required.
- TES:** 4, 0 and 4, +1.
- TREES:** Common or well represented. *Pinus edulis*, *Juniperus* spp.; infrequent *Populus angustifolia* in some areas.
- SHRUBS:** Abundant. *Chrysothamnus nauseosus* var. *graveolens*, *Fallugia paradoxa*, *Atriplex canescens*, *Artemisia tridentata*, *Brickellia californica*, *Gutierrezia sarothrae*.
- HERBS:** Well represented. *Bouteloua gracilis*, *B. curtipendula*, *Agropyron smithii*, and numerous other grasses and forbs.
- DIS:** Widespread in NM and AZ but very local in the landscape.
- ALSO SEE:** Mapping unit 71 in TES for Carson National Forest (Edwards 1987). If cottonwoods are common, see riparian forests.
- COMMENTS:** Periodic flooding, arroyo cutting, and sustained livestock grazing can weaken the tree and perennial grass components and increase the importance of shrubs and annuals.

Pinus Edulis/Cercocarpus montanus

Pinyon pine/Mountain mahogany
PIED/CEMO

Quercus undulata phase 204031
Quercus gambelii phase 204033

- SITE:** Mostly steep and moderately steep slopes from 6,700-7,500 ft.; often Udic and Lithic Ustochrepts; MAP about 18 in/yr, mean annual air temperature about 53 F.
- TES:** 4, 0, +1.
- TREES:** Well represented. *Pinus edulis*, *Juniperus scopulorum*, *Juniperus monosperma* (lower elevation sites), *Juniperus osteosperma*.
- SHRUBS:** Often abundant. *Cercocarpus montanus*, *C.m. var. paucidentata*, *Rhus trilobata*, *Amelanchier spp.*, *Berberis haematocarpa*, *Quercus undulata*, *Q. gambelii*, *Fendlera rupicola*, *Yucca baccata*.
- HERBS:** Common or well represented, but much less important than shrubs. *Bouteloua curtipendula*, *B. gracilis*, *B. hirsuta*, *Andropogon scoparium*, *Muhlenbergia pauciflora*, *Lycurus phleoides*.
- DIS:** se-AZ, NM, s-CO.
- ALSO SEE:** *Pinus edulis*-*Juniperus osteosperma*/*Amelanchier utahensis*-*Cercocarpus montanus* (Johnston 1984); *Pinus edulis*-*Juniperus monosperma*/*Cercocarpus montanus*/*Andropogon gerardi* (Kennedy 1983); TES mapping unit 105 in Cuba and Coyote Ranger Districts, Santa Fe National Forest (Gass et al 1981, Price 1983).
- COMMENTS:** Excellent habitat for wildlife browse and winter range.

Pinus edulis/Festuca arizonica

13W

Pinyon pine/Arizona Fescue
PIED/FEAR

204310

SITE: Adjoins Pinus ponderosa forests; MAP = 18 in/yr.

TES: 4, +1.

TREES: Abundant. Pinus edulis with minor cover by Juniperus monosperma or J. osteosperma.

SHRUBS: Scarce.

HERBS: Well represented. Festuca arizonica*, Muhlenbergia montana, Koeleria macrantha, Poa fendleriana, Blepharoneuron tricholepis, Bouteloua gracilis. Forbs are minor.

DIS: n-AZ; local in NM (MT Taylor RD, Cibola NF).

ALSO SEE: PIED/POFE and PIED/STC03 are very similar; for description in Grand Canyon National Park, AZ, see Merkle (1957).

COMMENTS:

Pinus edulis/Poa fendleriana

14W

Pinyon pine/Muttongrass
PIED/POFE

204060

- SYN: *Pinus edulis*-*Juniperus osteosperma*/*Poa fendleriana* (Johnston 1984);
Pinus edulis-*Juniperus monosperma*/mixed shrub/*Muhlenbergia montana*.
(Barnes 1987)
- SITE: MAP = 18 in/yr and mean annual air temperature = 47 deg. F. In the
Jemez Mts., NM, elevations are around 6500-7100 ft., on n- and e-
slopes (Barnes 1987); s-facing slopes to 8400 ft. in Sandia Mts.
- TES: 4, +1 (mostly LSC).
- TREES: Abundant to luxuriant. *Pinus edulis* (C), *Juniperus osteosperma* (C),
J. monosperma and *J. scopulorum* (c, depending on geography).
- SHRUBS: Scarce to common. *Yucca angustissima*, *Y. baccata*, *Opuntia*
polyacantha. *Artemisia tridentata* (< 1 percent cover),
Cercocarpus montana, *Fallugia paradoxa* (granitic soils).
- HERBS: Well represented to abundant especially grasses. *Poa fendleriana*,
Koeleria macrantha, *Muhlenbergia montana*, *Aristida fendleriana*,
A. longiseta, *Oryzopsis micrantha*, *Blepharoneuron tricholepis*,
Agropyron smithii, *Bouteloua gracilis*, *Stipa* spp. Forbs are minor
but can increase on disturbed sites. *Mertensia macdougallii*,
Artemisia ludoviciana, *Lotus wrightii*, *Phlox* spp., *Hymenopappus*
lugens, *Mirabilis multiflora*.
- DIS: n-AZ, s-UT, sw-CO, n-NM (Sandia Mts, Chuska Mts, etc)
- ALSO SEE: If *Festuca arizonica* is common, see PIED/FEAR; PIED/POFE is closely
related to PIED/STCO3. If *Artemisia tridentata* is common, see
PIED/ARTR. In Colorado see Johnston (1984), Erdman, Douglas, and
Marr (1969). In NM see TES mapping unit 194 (Edwards 1987), 203,
204, 205 (Price 1983), and 78, 208 (Gass et al 1981).
- COMMENTS: For comparison between PIED/POFE, PIED/BOGR, and JUMO/BOCU in
Jemez Mts., (Los Alamos), NM, see Barnes (1987). Overgrazed sites
of PIED/POFE can lack cool season grasses and may resemble
PIED/BOGR (8W).



Pinyon pine/Muttongrass

Habitat Type (14W)

Pinus edulis/Purshia tridentata

15W

Pinyon pine/Bitterbrush
PIED/PUTR

204050

SYN: Pinus edulis-Juniperus osteosperma/Purshia tridentata
(Johnston 1984).

SITE: Mesas and scarps, 6,900-7,500 ft.; San Jose Formation.

TES: 4, +1.

TREES: Well represented or abundant. Pinus edulis (C), Juniperus
osteosperma (C), Quercus gambelii (s).

SHRUBS: Well represented. Purshia tridentata*, Amelanchier utahensis, Yucca
baccata, Ribes cereum, Cercocarpus montanus, Artemisia tridentata (<
1% cover), Ephedra viridis.

HERBS: Scarce or common. Poa fendleriana, Koeleria macrantha, Carex
rossii, Oryzopsis micrantha, Eriogonum jamesii, Phlox spp.

DIS: nw-NM and sw-CO.

ALSO SEE: Pinus edulis/Artemisia tridentata if Artemisia tridentata is well
represented; Erdman, Douglas, and Marr (1969). PIED/PUTR on steep
mesa scarps intergrades to scarp woodland (1W); TES mapping unit 769
in Jicarilla RD, Carson NF (Edwards et al 1987).

COMMENTS: This h.t. is important winter range for deer and elk. Periodic fire
may be necessary to maintain bitterbrush.

Pinus edulis/Quercus gambelii

16W

Pinyon pine/Gambel oak
PIED/QUGA

204040

SITE: Usually moderate and steep mountain slopes, 6300-7500 ft. on cool, wet sites such as draws of n-slopes; MAP about 18 in/yr, MAT about 48 F (cold winters).

TES: 4, +1.

TREES: Abundant. *Pinus edulis*, *Quercus gambelii* (S), *Juniperus monosperma* (s), *Pinus ponderosa* (a), *Juniperus scopulorum*.

SHRUBS: Well represented. *Quercus gambelii* (shrub form), *Symphoricarpos oreophila*, *Cercocarpus montana*, *Quercus undulata*, *Fendlera rupicola*, *Prunus* spp, *Rosa* spp., *Artemisia tridentata*, *Amelanchier utahensis*.

HERBS: Common or well represented. *Poa fendleriana*, *Koeleria macrantha*, *Muhlenbergia montana*, *Carex rossii*, *Sitanion hystrix*, *Bouteloua gracilis*, *Geranium caespitosum*, *Vicia americana*, *Achillea millefolium*, *Senecio neomexicanus*.

DIS: Local in s-NM becoming more widespread in c- and n-NM.

ALSO SEE: TES mapping units 119, 140, 157, and 195 in Carson NF (Edwards 1987; also Johnston (1984) in CO and Warren et al (1982) *Pinus edulis*-*Amelanchier utahensis*-*Quercus gambelii* assoc. in Grand Canyon NP.

COMMENTS: This woodland can form a closed canopy (luxuriant tree cover) in prolonged cessation of disturbances such as fire (postclimax).

Pinus edulis/Quercus undulata

17W

Pinyon pine/Wavyleaf oak
PIED/QUUN

204360

SITE: Moderate and steep mountain slopes, 6,000-7,000 ft.; often lithic skeletal soils.

TES: 4, 0.

TREES: Well represented or abundant. Pinus edulis, Juniperus deppeana. Juniperus monosperma.

SHRUBS: Abundant. Quercus undulata, Berberis haematocarpa, Fendlera rupicola, Garrya wrightii, Rhus trilobata, Cercocarpus montanus, Yucca baccata, Prunus spp.

HERBS: Common. Numerous species of grasses and forbs, but none are more than 5 percent cover.

DIS: s- to c-NM; local in n-NM.

ALSO SEE: PIED/MUDU, PIED/STCO3, and PIED/MUPA all contain Quercus undulata but this oak seldom exceeds about 15 percent cover in mature stands. Wavyleaf oak is a vigorous sprouter after fire or clearing, and early successional stages of these different h.t.s may be difficult to separate. See Naumann's (1987) Pinus edulis-Juniperus monosperma/Quercus undulata/(Schizachyrium scoparium phase).

COMMENTS:

Pinus edulis/Rockland

18W

Pinyon-pine/Rockland
PIED/ROCKLAND

204350

SITE: Lava flows (malpais) or soils < 4 inches to bedrock.

TES: 4, 0, +1.

TREES: Well represented, often rooted in fissures. *Pinus edulis*, *Juniperus deppeana*, *J. monosperma*.

SHRUBS: Common to well represented. *Fallugia paradoxa*, *Atriplex canescens*, *Opuntia* spp., *Rhus trilobata*, *Ephedra viridis*, *Quercus turbinella*, *Glossopetalon nevadense* (in AZ).

HERBS: Scarce or common. Composition is highly variable.

DIS: Zuni Mountains, NM, Peloncillo Mountains, NM, scattered locations elsewhere in NM and AZ.

ALSO SEE: Lindsey (1951); *Pinus edulis*-*Juniperus osteosperma*-*Quercus turbinella*-*Cercocarpus intricatus* assoc. in Grand Canyon NP (Warren et al 1982)

COMMENTS:

Pinus edulis/Sparse community type

Pinyon pine/Sparse
PIED/SPARSE

204500

SITE: Often between 6500-7300 ft. on basaltic mesas or hill slopes; soils are highly variable, and on-site determination may be required (see comments).

TES: 4, 0.

TREES: Abundant. *Pinus edulis*, *Juniperus osteosperma*, *J. deppeana*, occasionally *J. monosperma*.

SHRUBS: Scarce or common. *Rhus trilobata*, *Opuntia* spp.

HERBS: Perennial herbs are scarce, annuals may be common to well represented or even abundant.

DIS: Widespread especially in AZ and sw-NM; local in n-NM and n-AZ.

ALSO SEE: Dalen and Snyder (1986). On soils derived from sandstone and gypsum see TES mapping unit 106 (Santa Fe NF, Gass et al 1981, Price 1983).

COMMENTS: This community type is derived from woodlands with a history of livestock grazing, soil erosion, and fire cessation. It may be an advanced successional stage from several habitat types, as well as a prolonged successional stage (disclimax) under current soil and management conditions. Erosional "badlands" represent PIED/SPARSE as a natural plant association.

Pinus edulis/Stipa columbiana

20W

Pinyon pine/Western needle grass
PIED/STCO3

204370

SYN: *Pinus edulis*-*Juniperus monosperma*/*Stipa columbiana* (Kennedy 1983).

SITE: Moderate to gentle slopes, 6,200-7,300 ft.

TES: 4, 0.

TREES: Well represented to abundant. *Pinus edulis* (C), *Juniperus monosperma* (S), *Juniperus deppeana* (a).

SHRUBS: Scarce to common. *Quercus undulata*, *Rhus trilobata*.

HERBS: Well represented to abundant. *Bouteloua gracilis*, *Bouteloua curtipendula*, *Muhlenbergia montana*, *Stipa columbiana*, *S. schribneri*, *Sitanion hystrix*, *Schizachyrium scoparium* (*Andropogon scoparium*), *Oryzopsis micrantha*, *Andropogon gerardi*, *Lithospermum multiflorum*.

DIS: Sacramento and Jicarilla Mts to as far north as Rowe Mesa (Pecos Range Districts, Santa Fe National Forest).

ALSO SEE: PIED/MUPA and PIED/STCO3 are very similar and may be related successionaly (see Kennedy 1983).

COMMENTS:

Juniperus monosperma/Andropogon hallii

21W

One-seed juniper/Sand bluestem
JUMO/ANHA

201340

SITE: Valley plains with deep, sandy soils (Typic Ustipsamments).

TES: 4, -1 HSC, LSC.

TREES: Well represented. *Juniperus monosperma*.

SHRUBS: Usually scarce, but sometimes well represented. *Artemisia filifolia*, *Artemisia tridentata* (LSC climate), *Yucca elata*, *Dalea scoparia**, *Rhus trilobata*, *Chrysothamnus* spp.

HERBS: Well represented. *Andropogon hallii**, *Muhlenbergia pungens**, *Andropogon scoparium* (*Schizachyrium scoparium*), *Bouteloua gracilis*, *Sporobolus cryptandrus*, *Sporobolus contractus*, *Erysimum repandum*, *Oryzopsis hymenoides*.

DIS: Local in c- and n-NM.

ALSO SEE: TES mapping units 143 and 144, Carson National Forest (Edwards 1987).

COMMENTS:



One-seed juniper/Sand bluestem

Habitat Type (21W)

Juniperus monosperma/Artemisia bigelovii

22W

One-seed juniper/Bigelow sage
JUMO/ARBI

201350

SYN:

SITE: Limestone mesas and hillslopes; very shallow, rocky soils (Lithic Ustochrepts and Lithic Ustorthents), 5,000-7,000 ft.; MAP about 14 in/yr.

TES: 4, -1.

TREES: Well represented (cover < 10 percent). *Juniperus monosperma* (C), *Pinus edulis* (a).

SHRUBS: Well represented. *Artemisia bigelovii**, *Atriplex canescens*, *Ceratioides lanata*, *Berberis fremontii*, *Ephedra* spp.

HERBS: Well represented. *Bouteloua gracilis*, *B. eriopoda*, *Aristida* spp., *Lycurus phleoides*, *Stipa comata*, *Stipa neomexicana*, *Zinnia grandiflora*.

DIS: Local in n-AZ, n-AZ, and possibly s-UT and sw-CO.

ALSO SEE: PIED/ROCKLAND.

COMMENTS: Good winter range for deer and elk.

Juniperus monosperma/Artemisia tridentata

23W

One-seed juniper/Big sagebrush
JUMO/ARTR

201040

- SITE:** Elevated and piedmont plains, 6,600-6,800 ft.; MAP = 14 in/yr.
A wide variety of soils include calcareous Typic Ustochrepts and Aridic Haplustalfs (consult TES reports and verify on-site soils.)
- TES:** 4, -1, LSC.
- TREES:** Well represented. *Juniperus monosperma* (cover to about 10 percent).
- SHRUBS:** Well represented. *Artemisia tridentata**, *Gutierrezia sarothrae*, *Opuntia polyacantha*, *Atriplex canescens*, *Hymenoxys richardsonii*, *Chrysothamnus nauseosus*.
- HERBS:** Well represented. *Hilaria jamesii*, *Sporobolus cryptandrus*, *S. arioides*, *Oryzopsis hymenoides*, *Sitanium hystrix*, *Agropyron smithii*, *Leucelene ericoides*, *Aristida longiseta*, *Aristida fendleriana*, *Bouteloua gracilis*, *B. hirsuta*, *B. curtipendula*, *Eriogonum jamesii*, *Stipa neomexicana*.
- DIS:** n-NM.
- ALSO SEE:** *Juniperus monosperma/Artemisia tridentata/Hilaria jamesii-Sporobolus cryptandrus* plant community (Francis 1986); JUOS/ARTR; TES mapping unit 111 for Santa Fe NF (Price 1983) and mapping unit 143 for Carson NF (Edwards 1987).
- COMMENTS:** *Sporobolus arioides* and *Agropyron smithii* may be indicative of clayey soils (Alfisols), whereas *Bouteloua curtipendula* and other grasses may suggest non-clayey soils (Inceptisols or Entisols) Livestock grazing can result in higher density or cover of *Gutierrezia sarothrae*, *Hymenoxys*, *Bouteloua gracilis*, or *Chrysothamnus nauseosus*.

Juniperus monosperma/Bouteloua curtipendula ^{24W}

One-seed juniper/Sideoats grama
JUMO/BOCU

201010

SITE: 5500-6400 ft., often on s-aspects (Jemez mts., NM), typically escarpments, hill- or mountainslopes > 15 percent; soils stony or rocky, often interrupted by rock outcrop, wide variety of parent materials.

TES: 4, -1.

TREES: Abundant. *Juniperus monosperma* (C), *Pinus edulis* (a or c).

SHRUBS: Common to well represented. *Rhus trilobata*, *Artemisia tridentata* (< 1%), *Cercocarpus montanus*, *Quercus undulata*, *Gutierrezia sarothrae*, *Opuntia imbricata*.

HERBS: Common to well represented. *Bouteloua gracilis*, *B. curtipendula*, *B. hirsuta*, *B. eriopoda*, *Hilaria jamesii*, *Muhlenbergia pauciflora*, *Andropogon scoparius*, *Lycurus phleoides*, *Poa fendleriana*, *Stipa* spp., *Mirabelis multiflora*, *Eriogonum jamesii*, *Erigeron nudiflorus*.

DIS: Reported from Jemez Mts., NM, into s-CO (Barnes 1987, Johnston 1984); doubtless more widespread.

ALSO SEE: Scarp woodland on steep, rocky slopes; JUMO/BOGR on gentle slopes where sedimentation tends to be depositional.

COMMENTS:

Juniperus monosperma/Bouteloua gracilis

One-seed juniper/Blue grama
JUMO/BOGR

201020

SITE: Usually valley plains and piedmont alluvial fans, 5,500-7,000 ft.; wide variety of soils and parent materials; MAP = 14-16 in/yr.

TES: 4, -1.

TREES: Well represented. *Juniperus monosperma*, *Pinus edulis* (a).

SHRUBS: Scarce. On grazed ranges shrubs are well represented, including *Gutierrezia sarothrae*, *Chrysothamnus* spp., *Opuntia* spp.

HERBS: Abundant or luxuriant. *Bouteloua gracilis*, *Bouteloua eriopoda*, *Hilaria jamesii*, *Aristida fendleriana*, *A. longiseta*, *Sporobolus cryptandrus*, *Sitanion hystrix*, *Poa fendleriana*, *Koeleria macrantha*, *Stipa* spp., *Muhlenbergia torreyi*, *Eriogonum wrightii*, *Artemisia frigida*, *Sphaeralcea*, *Leucelene ericoides*, *Hymenoxys richardsonii*, *H. lugens*, *Psoralea tenuiflora*.

DIS: Widespread in NM and AZ, s-CO.

ALSO SEE: Dick-Peddie *et al* (1984), Francis (1986), Johnsen (1962); Blue grama-cholla-juniper association in New Mexico Environmental Inst. (1971); TES mapping units 143 and 168 in Carson National Forest, and 112 in Santa Fe National Forest (Edwards 1987, Price 1983).

COMMENTS: *Juniperus osteosperma/Bouteloua gracilis* (JUOS/BOGR) is similar to JUMO/BOGR. More data are needed before the two habitat types are better distinguished. At present separation of JUMO/BOGR and is mostly geographical.

Juniperus monosperma/Ceratoides lanata

26W

One-seed juniper/Winterfat
JUMO/CELA

201400

SITE: Valley plains, 6,000-6,500 ft.; calcareous soils.

TES: 4, -1.

TREES: Well represented. *Juniperus monosperma*.

SHRUBS: Well represented. *Ceratoides lanata**, *Atriplex canescens*, *Opuntia imbricata*, *Rhus trilobata*, *Yucca elata*, *Gutierrezia sarothrae*.

HERBS: Well represented or abundant. *Bouteloua gracilis*, *Sporobolus cryptandrus*, *S. contractus*, *Oryzopsis hymenoides*, *Sitanion hystrix*, *Stipa neomexicana*, *Hilaria jamesii*, *Muhlenbergia torreyi*, *Sphaeralcea* spp., *Leucelene ericoildes*.

ALSO SEE:

COMMENTS:

**Juniperus monosperma/Chrysothamnus
nauseosus - fallugia paradoxa**

27W

One-seed juniper/Rabbitbrush-Apache plume
JUMO/CHNA-FAPA

201330

- SITE:** Intermittent washes and river terraces, 5,000-6,500 ft., common soils are Typic Ustifluvents, Fluventic Haplustolls, and Fluventic Ustochrepts (see TES reports and verify on-site soils). The soils are often cut by gullies and arroyos.
- TES:** 4, -1.
- TREES:** Common or well represented. *Juniperus monosperma*, *J. scopulorum*, infrequent or rare *Populus angustifolia*. *Juniperus osteosperma* may be the dominant tree in n-AZ.
- SHRUBS:** Abundant. *Chrysothamnus nauseosus* var. *graveolens*, *Fallugia paradoxa*, *Artemisia tridentata*, *Atriplex canescens*, *Brickellia californica*, *Gutierrezia sarothrae*.
- HERBS:** Well represented. Numerous species of grasses and forbs including *Bouteloua gracilis*, *B. curtipendula*, *Muhlenbergia porteri*, *Agropyron smithii*, and *Astragalus flavus*.
- DIS:** Widespread in NM and AZ but very local in the landscape.
- ALSO SEE:** Shrub riparian in Dick-Peddie et al (1984); mapping unit 34 in Carson National Forest (Edwards et al 1987); *Chrysothamnus nauseosus* series if trees are scarce (Moir 1983); PIED/CHNA-FAPA (11W) if *Pinus edulis* is common.
- COMMENTS:** Highly disturbed habitat type, both by man and hydrologic forces. Arroyo cutting and lowered water tables can reduce or eliminate the potential for cottonwoods (*Populus angustifolia*). *Fallugia paradoxa* is an indicator of excessive drainage (e.g., deep gravelly soils).

Juniperus monosperma/Quercus undulata

28W

One-seed juniper/Wavyleaf oak
JUMO/QUUN

201360

SITE: Rocky slopes between 15-40 percent gradient, intergrading to scarp woodland with increasing steepness and rock outcrop terrain. 6,000-6,500 ft.

TES: 4, -1.

TREES: Well represented. *Juniperus monosperma* of low stature (<16 ft.).

SHRUBS: Abundant. *Quercus undulata*, *Q. turbinella*, *Fallugia paradoxa*, *Atriplex canescens*, *Nolina microcarpa*, *Dalea formosa*, *Opuntia imbricata*, *Opuntia* spp., *Cercocarpus breviflorus*, *Yucca* spp., *Lycium pallidum*, *Ephedra viridis*.

HERBS: Common. *Bouteloua curtipendula*, *Bouteloua* spp., *Muhlenbergia porteri*, *M. pauciflora*, *Stipa* spp., *Sitanion hystrix*, *Eragrostis intermedia*, *Artemisia* spp.

DIS: c- and s-NM; local in n-NM.

ALSO SEE: New Mexico Environmental Inst. (1971): Juniper-oak breaks and Juniper associations; Martin, Fletcher, and Knight (1981); Naumann (1987). Otherwise a poorly described chaparral woodland association.

COMMENTS:

Juniperus osteosperma/Artemisia tridentata

29W

Utah juniper/big sagebrush
JUOS/ARTR

202020

SITE: Elevations between 5,500-7,000 ft. from nearly level to steeply sloping piedmont plains; MAP 10-14 in/yr, much of this as winter snow; soils often on gullied alluvium.

TES: 4, -1 LSC.

TREES: Well represented but cover usually < 15 percent. *Juniperus osteosperma* occasionally mixed with *J. monosperma*.

SHRUBS: Well represented. *Artemisia tridentata**, *Artemisia arbuscula*, *Atriplex canescens*, *Cowania mexicana*, *Gutierrezia sarothrae*, *Opuntia* spp., *Hymenoxys richardsonii*.

HERBS: Well represented to abundant, especially grasses. *Bouteloua gracilis*, *B. hirsuta*, *B. curtipendula*, *Hilaria jamesii*, *Aristida* spp, *Agropyron smithii*, *Sitanion hystrix*, *Oryzopsis hymenoides*.

DIS: n-AZ, n-NM to sw-CO, UT, NV, WY.

ALSO SEE: TES mapping unit 111 on Santa Fe NF (Price 1983). JUMO/ARTR (23W) is very similar. Some of the JUOS communities described in s-NV by Blackburn, Tueller, and Eckert (1969) can probably be assigned to this association.

**Juniperus osteosperma-J.
Monosperma/Sparse community type**

30W

Juniper/Sparse c.t. (h.t.)
JUOS-JUMO/SPARSE c.t. (h.t.)

202500

SITE: 5,000-6,400 ft. often adjoining grasslands of valley plains or piedmont slopes; MAP = 14-16 in/yr. but as low as 12 in/yr. wide variety of soils and parent materials. See comments.

TES: 4, -1.

TREES: Well represented to abundant. *Juniperus osteosperma* and *J. monosperma*.

SHRUBS: Scarce.

HERBS: Perennials are scarce. For list see JUMO/BOGR (25W).

DIS: Widespread in NM and AZ.

ALSO SEE: Johnsen (1962), Baxter (1977), Dalen and Snyder (1986); JUMO/BOGR (25W).

COMMENTS: Often Juniper/Sparse is a degraded stage of other habitat types. Where soil erosion is naturally intense, Juniper/Sparse may be a "badland" plant association, as well as on special parent materials such as gypsum. Soil and landform features are critical in helping distinguish seral or climax (potential) expressions of Juniper/Sparse.

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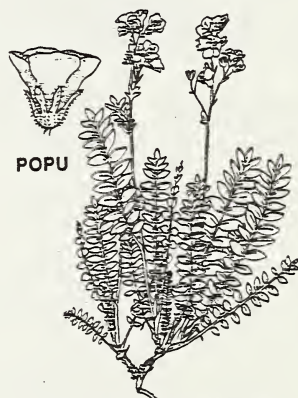
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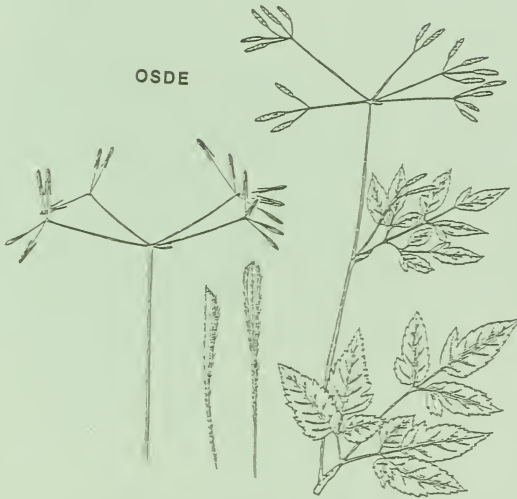
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POPU

Polemonium pulcherrimum
(skunkleaf jacob's ladder)

BOTANY



Osmorhiza depauperata (sweet cicely)



SMST

Smilacina stellata
(Narrow-leaf false Solomon seal)



Ramischla secunda
(one-sided wintergreen)



ACGL



Acer glabrum (Rocky Mountain maple)

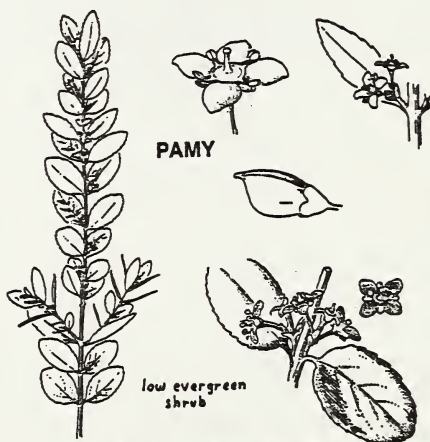
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Pachistima myrsinites

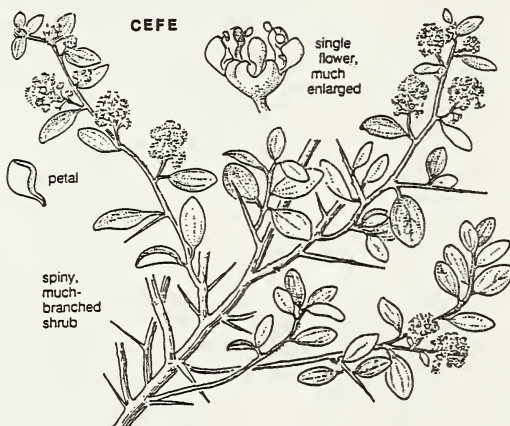
Plant Association Symbols and Names

(Alphabetical by Botanical Name)

Northern New Mexico---Northern Arizona

<u>Symbol</u>	<u>Botanical Name</u>	<u>Common Name</u>
ABCO	<i>Abies concolor</i>	white fir
ABLA	<i>Abies lasiocarpa</i>	subalpine fir, corkbark fir
ACGL	<i>Acer glabrum</i>	Rocky Mountain maple
AGSM	<i>Agropyron smithii</i>	western wheatgrass
ALTE	<i>Alnus tenuifolia</i>	thinleaf alder
ANGE	<i>Andropogon gerardi</i>	big bluestem
ANHA	<i>Andropogon hallii</i>	sand bluestem
ANSC	<i>Andropogon scoparium</i> (SCSC) (<i>Schizachyrium</i>)	little bluestem
ARARN	<i>Artemisia arbuscula</i> ssp nova	low sagebrush
ARBI	<i>Artemisia bigelovii</i>	bigelow sage
ARFI	<i>Artemisia filifolia</i>	sand sage
ARTR	<i>Artemisia tridentata</i>	big sagebrush
ARPU	<i>Arctostaphylos pungens</i>	manzanita
ARUV	<i>Arctostaphylos uva-ursi</i>	bearberry, kinnikinnik
BERE	<i>Berberis repens</i>	Oregon grape
BOCU	<i>Bouteloua curtipendula</i>	sideoats grama
BOGR	<i>Bouteloua gracilis</i>	Blue grama
BRCI	<i>Bromus ciliatus</i>	fringed brome
CACO	<i>Cardamine cordifolia</i>	heartleaf bittercress
CAFO	<i>Carex foenea</i>	foeny sedge
CELA	<i>Ceratoides lanata</i>	winterfat
CHNA	<i>Chrysothamus nauseous</i>	rabbitbrush
CORA	<i>Coleogyne ramosissima</i>	blackbrush
COME	<i>Cowania stansburiana</i> var mexicana	cliffrose
COST	<i>Cornus stolonifera</i>	red ozier dogwood
DASC	<i>Dalea scoparia</i>	sand indigobush
DAPA	<i>Danthonia parryi</i>	parry oatgrass
EREX	<i>Erigeron eximius</i>	forest fleabane
FAPA	<i>Fallugia paradoxa</i>	Apache plume
FEAR	<i>Festuca arizonica</i>	Arizona fescue
FETH	<i>Festuca thurberi</i>	Thurber fescue
GERO	<i>Geum rossii</i>	alpine avens
HODU	<i>Holodiscus dumosus</i>	oceanspray
JUCO	<i>Juniperus communis</i>	common or ground juniper
JUMO	<i>Juniperus monosperma</i>	one seed juniper
JUOS	<i>Juniperus osteosperma</i>	Utah juniper
LAAR	<i>Lathyrus arizonica</i>	Arizona peavine
LIBO	<i>Linnaea borealis</i>	twin flower

MECI	<i>Mertensia ciliata</i>	bluebells
MUMO	<i>Muhlenbergia montana</i>	mountain muhly
MUVI	<i>Muhlenbergia virescens</i>	screwleaf muhly
ORHY	<i>Oryzopsis hymenoides</i>	indian ricegrass
OXFE	<i>Oxypolis fendleri</i>	Fendler cowbane
PHMO	<i>Physocarpus monogynus</i>	Ninebark
PIEN	<i>Picea engelmannii</i>	Englemann spruce
PIPU	<i>Picea pungens</i>	blue spruce
PIAR	<i>Pinus aristata</i>	bristlecone pine
PIED	<i>Pinus edulis</i>	pinyon pine
PIFL	<i>Pinus flexilis</i>	limber pine
PIPO	<i>Pinus ponderosa</i>	ponderosa pine
POAN	<i>Populus angustifolia</i>	narrow-leaf cottonwood
POFE	<i>Poa fendleriana</i>	muttongrass
POPR	<i>Poa pratensis</i>	Kentucky bluegrass
POPU	<i>Polemonium pulcherrimum</i>	Jacob's ladder
PSME	<i>Pseudotsuga menziesii</i> var <i>glabrum</i>	Douglas-fir
PUTR	<i>Purshia tridentata</i>	bitterbrush
QUGA	<i>Quercus gambelii</i>	Gambel oak
QUUN	<i>Quercus undulata</i>	wavyleaf oak
RIMO	<i>Ribes montigenum</i>	subalpine prickly current
RONE	<i>Robinia neomexicana</i>	New Mexico locust
RUPA	<i>Rubus parviflorus</i>	thimbleberry
SABC	<i>Salix bebbiana</i>	Bebb willow
SASC	<i>Salix scouleriana</i>	Forest willow
STIPA	<i>Stipa</i> spp.	Needlegrass, needle-and-thread
STCO3	<i>Stipa columbiana</i>	western needle grass
VAMY	<i>Vaccinium myrtillus</i>	myrtleleaf huckleberry
VASC	<i>Vaccinium scoparium</i>	grouse wortleberry

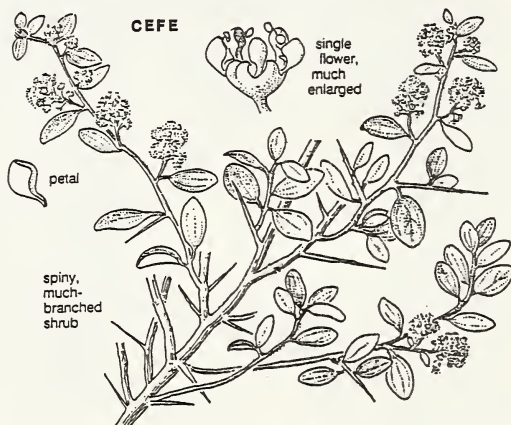


Ceanothus fendleri
(Fendler Ceanothus)

2

Conservation Resources
Lig-Free® Type I
Ph 8.5, Buffered

MECI	<i>Mertensia ciliata</i>	bluebells
MUMO	<i>Muhlenbergia montana</i>	mountain muhly
MUVI	<i>Muhlenbergia virescens</i>	screwleaf muhly
ORHY	<i>Oryzopsis hymenoides</i>	indian ricegrass
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SABC	<i>Salix bebbiana</i>	Bebb willow
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STIPA	<i>Stipa</i> spp.	Needlegrass, needle-and-thread
STC03	<i>Stipa columbiana</i>	western needle grass
VAMY	<i>Vaccinium myrtillus</i>	myrtleleaf huckleberry
VASC	<i>Vaccinium scoparium</i>	grouse wortleberry



Ceanothus fendleri
(Fendler Ceanothus)

Synoptic Table of Major Vascular Plant Families

(The 38 listed families comprise about 85% of species diversity in the SW)

Dicots

Family	Common Name	Form	K	C	A	G	Fruit Type	Miscellaneous Comments
Salicaceae	willow	TS	0-x	0	2-x	(2)	cap	seeds comose, plants dioecious, flws in catkins
Polygonaceae	knotweed	HS	5 or 3+3	0	3-9	(3)	ach	calyx often petaloid, ach often triangular, lvs alternate, simple
Chenopodiaceae	goosefoot	HS	5	0	5	(2)	nutl	lvs alternate, simple, exstipulate, perianth green inconspicuous
Amaranthaceae	pigweed	HS	4-5	0	4-5	(2-3)	utr, pyx	flws subtended by papery bracts, similar to goosefoot
Nyctaginaceae	four o'clock	HST	5	0	5	1	ach	bracts mimic sepals, sepals mimic petals, lvs simple, opposite stems tend to branch dichotomously
Portulacaceae	purslane	H	2	4-6	4-∞	2-8	cap	lvs often fleshy, cap dehisces longitudinal or circumscissile
Caryophyllaceae	pink	H	5 or (5)	5[0]	5-10	2-5	cap, utr	cap many seeded, lvs opposite, linear or lanceolate, stem nodes swollen
Ranunculaceae	buttercup	HS [V]	3-x	0-∞	∞	∞	fol, ach, ber	lvs often palmately dissected, exstipulate with a sheathing base
Cruciferae (Brassicaceae)	mustard	HS	4	4	4+2	(2)	sil, slq	petals cruciform, often clawed, often with acrid taste
Primulaceae	primrose	H	5	(5)	5	(5)	cap, pyx	plants mostly scapose, lvs simple, basal, opposite, stamens opposite petals
Saxifragaceae	saxifrage	HS	5[4]	5[4]	5 or 10	2	cap	hypanthium present, lvs alternate or basal, exstipulate
Rosaceae	rose	HST	5	5[0]	∞	∞(5)1	ach, drp, pom, fol leg	hypanthium present, lvs alternate, usually stipulate
Leguminosae (Fabaceae)	pea	HSTV	5	5 or 5z	5-∞	1	leg	lvs alternate, mostly compound, stamens usually 10
Euphorbiaceae	spurge	HST	0 or 5	0 or 5	1-∞	(3)	schizo	often with milky latex, fruit 3 nutlets, flws unisexual usually much reduced
Malvaceae	mallow	HST	3-5	5	∞	(5-∞)	cap, schizo	often with stellate pub, lvs alternate, palmately veined and/or lobed
Loasaceae	loasa	H	5	5	5-∞	(3-7)	cap	flws showy yellow to white, often with atinging or at least rough, bristly glochidiate hairs
Cactaceae	cactus	HS	x	∞	∞	(2-∞)	ber	usually spiny succulents
Onagraceae	evening primrose	HS	2 or 4	2 or 4	4 or 8	(4)	cap, ber, nutl	hypanthium present, stigmas often 4-lobed
Umbelliferae (Apiaceae)	parsley	H [S]	5	5	5	(2)	schizo	typically with a compound umbel, stems hollow, lvs compound petioles sheathing at base
Gentianaceae	gentian	H	4	(4-5)	4-5	(2)	cap, ber	lvs opposite, exstipulate, basally connate, glabrous
Asclepiadaceae	milkweed	HSV	5	(5)	5	(2)	fol	often with milky sap, lvs opposite or whorled, corona and other specialized parts
Apocynaceae	dogbane	HSV	(5)	(5)	5	(2)	fol, ber, cap	often with milky sap, lvs entire opposite or whorled, carpels free at base, lacking specialized parts of milkweed
Convolvulaceae	morning glory	HSV	5	(5)	5	(2)	cap, ber, nut	often with milky sap, twining herbaceous vines in N Hemisphere, corolla plaited
Polemoniaceae	phlox	H	(5)	(5)	5	(3)	cap	flws often funnelform or salverform, stamens often inserted at diff levels, 3 stigmas
Hydrophyllaceae	waterleaf	HS	(5)	(5)	5	(2)	cap	flws usually scorpioid, unilateral, bristly hairy
Boraginaceae	borage	H	5	(5)	5	(2)	nutl, ach, drp	ovary 4-lobed, scorpioid cymes, lvs simple, sessile, alternate, bristly hairy
Verbenaceae	verbena	HST	(5)	(5)z	2+2	(2)	drp, 2or4 nutl	lvs opp or whorled, single terminal style, stem often 4-angled
Labiatae (Lamiaceae)	mint	HS	(5)	(5)z	2 or 2+2	(2)	nutl, drp	ovary 4-lobed, 4-angled atems, style bifid at apex with unequal lobes
Solanaceae	nightshade	HSV	(5)	(5)	5	(2)	ber, cap	lvs alternate
Scrophulariaceae	figwort	HS	(5)	(5)z	2 2+2 [5]	(2)	ber, cap	ovary not 4-lobed, stamens usually didynamous with a sterile filament
Rubiaceae	madder	HST	4-5	(4-5)	4-5	(2)	ber, cap	stipules often leaflike, lvs opposite or whorled
Compositae (Asteraceae)	sunflower	HST	x	(5) or (5)z	5	(2)	ach	inflorescence in heads

Monocots

Family	Common Name	Form	K	C	A	G	Fruit Type	Miscellaneous Comments
Juncaceae	rush	H	3	3	6	(3)	cap	small grass-like herbs, 3-many seeded capsule, perianth scarious, green or brown
Cyperaceae	sedge	H	x	0	3	(2-3)	ach, nutl	grass-like, stems often 3-sided, solid, nodes not apparent
Liliaceae	lily	H	3	3	6[3]	3	cap, ber	fam often expanded to include Yucca and Agave
Agavaceae	agave	HS	3	3	6	(3)	cap, ber	flws subtended by spathe-like bracts, lvs persisting in basal rosette
Orchidaceae	orchid	H	3	2+1z	1-2	(3)	cap	lip often elaborate
Gramineae (Poaceae)	grass	H	2-3	0	3	(2-3)	cary	glumes present, stems hollow with obvious nodes

Character Explanation

Form: T=tree, S=shrub, H=herb, V=vine


K=calyx, C=corolla, A=androecium (stamens), G=gynoecium (carpels)


Symbols: $\overline{\quad}$ = fused by upper parts, $\underline{\quad}$ = fused by lower parts, $\underline{\quad}$ G=ovary


superior, $\overline{\quad}$ G=ovary inferior, Cz=corolla irregular, ()=parts united i.e. fused.


[] = rarely, x=low unstable number, ∞ = numerous

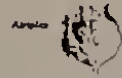
Fruit Types


achene = single seed tightly enclosed by the fruit wall as in sunflower family 


nut = 1-seeded fruit with hard shell 

nutlet = a small nut 


caryopsis = seed and fruit wall fused 


utricle = achene-like with seed loosely surrounded by fruit wall 


achizocarp = compound dry fruit splitting into 1-seeded indehiscent segments 


capsule = dry dehiscent several to many-seeded fruit of 2 or more carpels 


siliqua = 2-valved capsule where walls peel away from central partition 

silicle = silique not more than 2-3 times longer than wide 

pyxis = capsule opening by a lid 

legume = unicarpellata, dehiscent along both sutures 

follicle = unicarpellate, dehiscent along one suture 

berry = fruit wall (paricarp) fleshy as in a grape 

pome = inferior ovary where hypanthium forms fleshy fruit as in apple

drupe = paricarp divided into fleshy exterior and bony interior as in peach

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Conservation Resources
Lig-Free® Type I
Ph 8.5, Buffered

