

The SPENCE/ROMME/FLOYD-HANA/ROWLANDS (SRFR) Classification

Version 2.0
(January 1997)

John R. Spence

Resource Management Division

Glen Canyon NRA

P.O. Box 1507

Page, AZ 86040

520-608-6267

Email: John_Spence@nps.gov

INTRODUCTION

The hierarchical structure of the SRFR system is presented below. Each letter in the series ABCDEFG.HIJKL is associated with one of the seven levels in the hierarchy. In actual named vegetation, the letters are replaced by numbers, hence the sequence 1012011.01 represents the Picea engelmannii-Abies lasiocarpa series in the subalpine zone, evergreen forest and woodland formation, on the Colorado Plateau Province in the Nearctic realm (no association is indicated).

- A = Biogeographic Realm (1 for Nearctic realm; not shown in classification)
- BC = Floristic Province
- D = Climate-Elevation Zone
- EF = Plant Formation
- G = Physiognomic Class
- HI = Series (first two numbers to right of decimal)
- JKL = Association

The major difference between this version and version 1 is that I have added an extra level to reflect dominant plant species response to climate and soil moisture through leaf duration and life form (see definitions below). A preliminary classification of the Colorado Plateau to the series level is presented below. This listing highlights the many gaps in our knowledge of the vegetation on the Colorado Plateau. In particular, high elevation treeless vegetation and wetlands are poorly understood. A preliminary classification and analysis is also presented for the Sonoran-Mojave region.

DEFINITIONS

BC. FLORISTIC PROVINCE

The floristic provinces are taken from the analysis of S.P. McLaughlin (J. Biogeography 19: 21-32, 1992).

D. CLIMATE-ELEVATION ZONE

Two aspects of climate need to be considered, regional climate and orographic effects. For regional climate, there are two; subtropical-arid and arid-temperate with cold winters. Although there are latitudinal and longitudinal differences in climate on the Colorado Plateau at similar elevations, orographic effects predominate. The traditional division into boreal-arctic, cold and warm temperate, and subtropical zones is largely controlled by elevation on the Colorado Plateau and in the southwestern United States in general. We have re-drawn the climate zones as elevationally controlled zones, based largely on traditional zonation schemes. Climate zonation remains difficult to use because it can vary locally depending on aspect and topography. As climate data are scarce for much of the Colorado Plateau, no attempt is made here to provide

climatic definitions and characteristics for each zone. Some zonal boundaries remain poorly understood (eg., the montane-subalpine boundary). Also, riparian vegetation, as it consists of linear strips cutting across zones, will be more difficult to place into zones than most other kinds of vegetation. Future work addressing these problems, and also in providing a climatic characterization for each zone, is needed.

We recognize that vegetation rarely occurs as discrete elevational bands on the Colorado Plateau. An alternative system could be envisioned in which landscape elements (based on topography, elevation, soils, etc.) are the building blocks of a vegetation classification. Such a system, however, would be far more difficult to use because of its greatly increased complexity. Climate-elevation zones, although less realistic, provide a necessary tradeoff between accuracy of vegetation classification and practicality.

EF. FORMATION

Forest and woodland. Vegetation dominated by trees (usually or potentially >10 m in height). Forests have closed (interlocking or touching) canopies whereas woodlands have open canopies.

Thornscrub. Tropical-subtropical arid land formation dominated by a mix of microphyllous trees and shrubs, and tall succulents, often spiny or thorny (eg., as in Sonoran desert).

Savanna. Tropical-subtropical formation of grasses with an open canopy of widely spaced trees, dominated by seasonal grass layer. Does not occur on the Colorado Plateau.

Shrubland. Vegetation dominated by shrubs, >0.5m in height and mostly <5 m in height, usually multi-stemmed, open (shrubland or scrub) or densely interlocked (thickets). This is traditionally called scrub in many parts of the world.

Dwarf (mat) shrubland. Vegetation dominated by woody, single, or multi-stemmed dwarf or mat shrubs that are generally <0.5m in height.

Grassland. Vegetation dominated by perennial or annual species of grasses.

Marshland. Vegetation dominated by herbaceous obligate emergent wetland species of sedges, rushes, and cattails.

Forbland. Vegetation dominated by herbaceous perennial and annual species of broad leaved dicots, ferns, or non-graminoid monocots (eg., lilies, irises).

Aquatic. Vegetation dominated by herbaceous species that are supported by water, and are either rooted with their structures underwater or floating on the surface, or plants free-floating on the surface.

Cryptogamic. Vegetation dominated by cryptogams, either lichens or bryophytes (includes Sphagnum bogs).

Barren/Nival. Areas essentially bare of vegetation. These can include salt barrens, shale barrens, slickrock, snow or ice. Plants can be present, but occur only as scattered individuals with low cover. In some cases these areas can be named after specific plant species that occur on them. Nival (Permanent snow and ice with some exposed rock, dominated by cryptogams, with vascular plants rare) probably does not occur on the Colorado Plateau, except perhaps in the La Sal Mountains.

G. PHYSIOGNOMIC CLASS (tentative-more work is needed in some classes)

The dominant species in the vegetation is used to define the class. Mixed

classes are possible where no clear dominance occurs by a single species. Woody taxa are classified by leaf duration, including evergreen, cold-deciduous, and drought-deciduous. Grasses and related life forms are classified by height (short<1.0m or tall>1.0m) and growth (sod (rhizomatous, mat/turf) or bunch). Herbaceous forbs are classified by height (short<1.0m or tall>1.0m) and growth (cushion/mat/rosette, erect-stemmed). Marshlands are classified by height as in grasses. Aquatic vegetation is classified as either rooted or free-floating.

HI. SERIES

The series is a widely used term throughout the western United States, as used by the U.S. Forest Service in their extensive vegetation classifications. It is defined and named by the dominant species or codominants if more than one occur, in a community. Currently, no set of rules has been formulated for defining a series. We incorporated published series from a wide variety of sources into our classification. Series comprise actual vegetation on a site rather than potential vegetation. Another widely used term for this level (for example in the Nature Conservancy's Standard National Vegetation Classification) is alliance.

JKL. ASSOCIATION

Associations have traditionally been difficult to define, and we do not attempt to provide a definition here. There is, however, a consistent method available of naming them (eg., the U.S. Forest Service). The name is based on the dominants in all recognizable important strata. For example, under ponderosa pine series are the following associations (community-habitat types sensu U.S. Forest Service): Pinus ponderosa/Muhlenbergia virescens, P.p./Festuca arizonica, P.p./Arctostaphylos pungens, etc. Although the emphasis on classifying Colorado Plateau vegetation is not on the association, this method of recognizing and naming associations is probably the best system to use in order to prevent confusion with other work and to be consistent with classifications of the U.S. Forest Service.

01. COLORADO PLATEAU PROVINCE

(0 not shown below)

11 Alpine Zone (>3440 m)

1101 Grassland Formation

11011 Short Bunchgrass Grassland

11011.01 Carex elynoides series

11011.02 Festuca ovina series

11012 Short Sod Grassland

11013 Mixed Short Sod-Short Bunchgrass

1102 Forbland Formation

11021 Low Erect-Stem Forbland

11022 Mat Forbland

11022.01 Erigeron vagus series

11022.02 Geum rossii series

1103 Dwarf Shrubland Formation

11031 Evergreen Low Shrubland

11032 Winter (cold)-deciduous Low Shrubland

1104 Marshland Formation

1105 Aquatic Formation

1106 Barren Formation

12 Subalpine Zone (2750-3600 m)

1201 Forest and Woodland Formation

12011 Evergreen Forest and Woodland

12011.01 Picea engelmannii-Abies lasiocarpa series

12011.02 Picea engelmannii series

12011.03 Abies lasiocarpa series

12011.04 Pinus longaeva series

12012 Winter (cold)-deciduous Forest and Woodland

12012.01 Populus tremuloides series

1202 Shrubland Formation

1203 Dwarf Shrubland Formation

12031 Evergreen Dwarf Shrubland

12031.01 Juniperus communis series

12031.02 Potentilla fruticosa series

12031.03 Ribes montigenum series

12031.04 Salix wolfii series

12032 Winter (cold)-deciduous Dwarf Shrubland

1204 Grassland Formation

12041 Short Bunchgrass Grassland

12041.01 Festuca ovina series

12041.02 Festuca thurberi series

1205 Marshland Formation

1206 Forbland Formation

1207 Aquatic Formation

1208 Barren Formation

13 Montane Zone (1900-3100 m)

1301 Forest and Woodland Formation

13011 Evergreen Forest and Woodland

13011.01 Pseudotsuga menziesii series

13011.02 Abies concolor series

13011.03 Pinus ponderosa series

13011.04 Pinus flexilis series

13011.05 Juniperus scopulorum series

13011.06 Picea pungens series

13012 Winter (cold)-deciduous Forest and Woodland

13012.01 Populus tremuloides series

13012.02 Acer grandidentatum series

13013 Summer (drought)-deciduous Forest and Woodland

13014+ Mixed Classes

1302 Shrubland Formation

13021 Evergreen Shrubland

13021.01 Cercocarpus ledifolius series

13021.02 Chrysothamnus nauseosus series

13022 Winter (cold)-deciduous Shrubland

13022.01 Quercus gambelii series

13022.02 Amelanchier utahensis series

13022.03 Robinia neomexicana series

13022.04 Betula occidentalis series

13022.05 Alnus tenuifolia series

13022.06 Cornus stolonifera series

13022.07 Salix boothii series

13022.08 Salix bebbiana series

13023 Summer (drought)-deciduous Shrubland

13034+ Mixed Classes

1303 Dwarf Shrubland Formation

13031 Evergreen Dwarf Shrubland

13031.01 Artemisia nova series

13031.02 Purshia tridentata series

13031.03 Arctostaphylos patula series

13032 Winter (cold)-deciduous Dwarf Shrubland

13033 Summer (drought)-deciduous Dwarf Shrubland

13034+ Mixed Classes

1304 Grassland Formation

13041 Tall Bunchgrass Grasslands

- 13042 Short Bunchgrass Grasslands
 - 13042.01 Poa fendleriana series
- 13043 Short Sod Grassland
 - 13043.01 Bouteloua gracilis series
- 13044 Mixed Short Bunchgrass-Short Sodgrass Grassland
- 13045 Annual Grassland
- 1305 Marshland Formation
 - 13051 Tall Marshlands
 - 13052 Low Marshlands
 - 13052.01 Eleocharis palustris series
- 1306 Forbland Formation
 - 13061 Tall Erect-Stem Forbland
 - 13061.01 Pteridium aquilinum series
 - 13062 Low Erect-Stem Forbland
 - 13063 Mat Forbland
 - 13063.01 Eriogonum panguicense series
- 1307 Aquatic Formation
- 1308 Barren Formation
- 14 Submontane/Cold Temperate Lowland Zone (900-2200 m)
 - 1401 Forest and Woodland Formation
 - 14011 Evergreen Forest and Woodland
 - 14011.01 Pinus edulis series
 - 14011.02 Juniperus osteosperma series
 - 14011.03 Juniperus monosperma series
 - 14011.04 Pinus edulis-Juniperus osteosperma series
 - 14012 Winter (cold)-deciduous Forest and Woodland
 - 14012.01 Populus angustifolia series
 - 14012.02 Populus fremontii series
 - 14012.03 Salix goodingii series
 - 14012.04 Acer negundo series
 - 14012.05 Elaeagnus angustifolia series
 - 14012.06 Ostrya knowltonii series
 - 14012.07 Rhamnus betulifolia series
 - 14013 Summer (drought)-deciduous Forest and Woodland
 - 1402 Shrubland Formation
 - 14021 Evergreen Shrubland
 - 14021.01 Artemisia tridentata series
 - 14021.02 Sarcobatus vermiculatus series
 - 14021.03 Atriplex canescens series
 - 14021.04 Ceratoideus lanata series
 - 14021.05 Coleogyne ramosissima series
 - 14021.06 Artemisia filifolia series
 - 14021.07 Grayia spinosa series
 - 14021.08 Poliomintha incana series
 - 14021.09 Gutierrezia sarothrae series

- 14021.10 Vancleavea stylosa series
- 14021.11 Fallugia paradoxa series
- 14021.12 Parryella filifolia series
- 14021.13 Acamptopappus sphaerocephalus series
- 14022 Winter (cold)-deciduous Shrubland
 - 14022.01 Quercus gambelii series
 - 14022.02 Tamarix ramosissima series
 - 14022.03 Salix exigua series
 - 14022.04 Amelanchier utahensis series
 - 14022.05 Salix lutea series
 - 14022.06 Salix goodingii series
 - 14022.07 Eriogonum corymbosum series
 - 14022.08 Toxicodendron rydbergii series
- 14023 Summer (drought)-deciduous Tall Shrubland
- 1403 Dwarf Shrubland Formation
 - 14031 Evergreen Dwarf Shrubland
 - 14031.01 Artemisia spinescens series
 - 14031.02 Artemisia pygmaea series
 - 14031.03 Atriplex confertifolia series
 - 14031.04 Zuckia brandegei series
 - 14031.05 Atriplex corrugata series
 - 14031.06 Atriplex gardneri series
 - 14031.07 Ephedra viridis series
 - 14031.08 Ephedra cutleri series
 - 14032 Winter (cold)-deciduous Dwarf Shrubland
 - 14032.01 Quercus harvardii series
 - 14033 Summer (drought)-deciduous Dwarf Shrubland
 - 14034+ Mixed Classes
- 1404 Grassland Formation (not all classes shown or developed)
 - 14041 Tall Bunchgrass Grasslands
 - 14042 Short Bunchgrass Grasslands
 - 14042.01 Stipa hymenoides series
 - 14042.02 Stipa comata series
 - 14042.03 Sporobolus cryptandrus-S. contractus series
 - 14042.04 Sporobolus airoides series
 - 14042.05 Elymus salinus series
 - 14042.06 Panicum virgatum series
 - 14043 Tall Sod Grassland
 - 14043.01 Phragmites australis series
 - 14043.02 Calamovilfa gigantea series
 - 14044 Short Sod Grassland
 - 14044.01 Hilaria jamesii series
 - 14044.02 Bouteloua gracilis series
 - 14044.03 Distichlis spicata series
 - 14045 Mixed Short Bunchgrass-Short Sod Grassland
 - 14045.01 Hilaria jamesii-Aristida purpurea series
 - 14046 Annual Grassland
 - 14046.01 Bromus tectorum series

- 1405 Marshland Formation
- 14051 Tall Marshland
 - 14051.01 Typha latifolia series
 - 14051.02 Typha domingensis series
 - 14051.03 Scirpus validus series
 - 14051.04 Scirpus acutus series
 - 14052 Low Marshland
 - 14052.01 Juncus arcticus series
 - 14052.02 Scirpus pungens series
 - 14052.03 Eleocharis palustris series
 - 14052.04 Cyperus erythrorhizos series
 - 14052.05 Carex nebrascensis series
 - 14052.06 Juncus arcticus-Equisetum hyemale series
- 1406 Forbland Formation
- 14061 Tall Forbland
 - 14062 Short Forbland
 - 14062.01 Adiantum capillus-veneris series
 - 14062.02 Melilotus officinalis series
 - 14062.03 Solidago occidentalis series
 - 14062.04 Oxytenia acerosa series
 - 14062.05 Solidago canadensis series
 - 14063 Annual Forbland
 - 14063.01 Viguiera soliceps-Cleomella palmeriana series
 - 14063.02 Eriogonum inflatum series
 - 14063.03 Salsola australis series
- 1407 Aquatic Formation
- 14071 Rooted Aquatic
 - 14071.01 Zanichellia palustris series
 - 14072 Free-Floating Aquatic
 - 14072.01 Lemna minor series
- 1408 Barren Formation

02. SONORAN DESERT PROVINCE (preliminary)

Although I have recognized this province based on the analysis of McLaughlin, there may be good reasons to break out the Mojave and Sonoran Deserts into separate provinces from a vegetation classification approach. Levels below the climate zones would be the same as those for the Colorado Plateau, with the addition of the Thornscrub Formation. Physiognomic classes would include relatively few winter-cold deciduous classes below the montane zone.

21 Subalpine Zone (>3000 m; characteristic species include Pinus longaeva and P. flexilis)

22 Montane Zone (2000-3000 m; characteristic species include Abies concolor, Pinus monophylla, and Artemisia tridentata)

23 Cold-temperate Lowland Zone (1300-2100 m; characteristic species include Coleogyne ramosissima, Yucca brevifolia, Canotia holocantha, and Artemisia tridentata)

24 Warm-temperate Lowland Zone (300-1400 m, Mojavean; Larrea tridentata dominates this zone)

25 Subtropical Zone (<1000 m, Sonoran, Colorado Desert; a variety of hot desert shrubs and succulents characterize this zone)

