

1950

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Recommended Citation

Munz, Philip A. and Keck, David D. (1950) "California Plant Communities-Supplement," *Aliso: A Journal of Systematic and Evolutionary Botany*: Vol. 2: Iss. 3, Article 2.

Available at: <http://scholarship.claremont.edu/aliso/vol2/iss3/2>

CALIFORNIA PLANT COMMUNITIES—SUPPLEMENT

PHILIP A. MUNZ AND DAVID D. KECK*

The interest shown in our recent paper on California Plant Communities (El Aliso 2:87-105, 1949) has revealed to us that the time was definitely ripe for attempting such a treatment and to how much use such a classification could be put. During the past year each of us has discussed the subject with various groups and individuals to whom we are indebted for helpful suggestions. Most of these comments have come after field experience with our classification, and our own field work has shown the need for clarifying a few of our concepts. As a result we now wish to present a somewhat modified classification of Vegetation Types and Plant Communities for California.

The number of Vegetation Types we now recognize is reduced from fourteen to eleven. This simplification is due to the gathering together of the three Types characterized by a shrub cover (true Chaparral being excluded) into a single Vegetation Type called Scrub, and of the two characterized by coniferous trees into one Vegetation Type called Coniferous Forest. Simplification in terminology of several other Vegetation Types has helped to sharpen the distinction between them and the Plant Communities.

Experience has proven the desirability of adding four Plant Communities to our earlier list. These all occur in the North Coast Ranges, where we now follow more closely the classification of H. W. Clark (Ecology 18:214-230, 1937), not only because of a reconsideration of conditions in California, but also of those to the north of the state, where the areas under discussion are larger and of greater importance. These communities, therefore, are not very highly developed in California, although they do occur distinctly and extensively enough to warrant their inclusion in the present classification, but of equal importance is the fact that this addition lays the groundwork for possible extensions of this system of classification to the plant communities of the Pacific Northwest.

Table I indicates our present concept, and it is the counterpart of Table II of our former paper (l.c.,92). The number or numbers given in parenthesis after each name are those of the old classification.

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TABLE I. MAJOR VEGETATION TYPES AND PLANT COMMUNITIES OF CALIFORNIA, REVISED

<i>Vegetation Type</i>	<i>Plant Community</i>
I. Strand (I)	1. Coastal Strand (1)
II. Salt Marsh (II)	2. Coastal Salt Marsh (2)
III. Freshwater Marsh (III)	3. Freshwater Marsh (3)
IV. Scrub (IV, XIII, XIV)	4. Northern Coastal Scrub (4)
	5. Coastal Sage Scrub (5)
	6. Sagebrush Scrub (21)
	7. Shadscale Scrub (22)
	8. Creosote Bush Scrub (23)
	9. Alkali Sink (24)
	10. North Coastal Coniferous Forest
	11. Closed-cone Pine Forest (6)
	12. Redwood Forest (7)
V. Coniferous Forest (V, X)	13. Douglas-Fir Forest (included in 8)
	14. Yellow Pine Forest (13)
	15. Red Fir Forest (14)
	16. Lodgepole Forest (15)
	17. Subalpine Forest (16)
VI. Mixed Evergreen Forest (VI)	18. Mixed Evergreen Forest (8)
VII. Woodland-Savanna (VII)	19. Northern Oak Woodland (included in 8)
	20. Southern Oak Woodland (10)
	21. Foothill Woodland (9)
VIII. Chaparral (VIII)	22. Chaparral (11)
IX. Grassland (IX)	23. Coastal Prairie (included in 8)
	24. Valley Grassland (12)
X. Alpine Fell-fields (XI)	25. Alpine Fell-fields (17)
XI. Desert Woodland (XII)	26. Northern Juniper Woodland (18)
	27. Pinyon-Juniper Woodland (19)
	28. Joshua Tree Woodland (20)

The following Plant Communities are new to our classification or are changed from their status and description in our earlier paper and are therefore discussed:

10. North Coastal Coniferous Forest

Thuja plicata, *Tsuga heterophylla*, *Picea sitchensis*, *Pseudotsuga taxifolia*, *Abies grandis*, *Chamaecyparis Lawsoniana*, *Rhamnus Purshiana*, *Acer circinatum*.

Outer North Coast Range, Mendocino County northward, from near sea-level up to 1,000 feet or more; in occasional restricted patches as far south as Sonoma County.

Average rainfall 40 to 110 inches, with frequent dense fogs; growing season 8 to 12 months, with 225 to 360 frost-free days; temperature mild and equable; mean summer maxima 62°-70°, mean winter minima 38°-42° F.

Trees 150 to 200 feet tall or more; the forest dense and continuous, often with much undergrowth. Of increasing importance northward through Oregon and Washington.

13. Douglas-Fir Forest

Pseudotsuga taxifolia, *Lithocarpus densiflora*, *Arbutus Menziesii*, *Castanopsis chrysophylla*, *Pinus Lambertiana*.

North Coast Ranges from Mendocino County northward, scattered remnants southward to Sonoma and Marin counties, mostly east of the Red-

wood Forest and to elevations of 4,500 feet, but in some places reaching almost to the coast.

Climatic data much as for Mixed Evergreen Forest.

Trees to 200 feet high, in dense forests often of pure stands of *Pseudotsuga*.

Apparently best developed on east and north slopes in California. Common northward to British Columbia.

18. Mixed Evergreen Forest

Lithocarpus densiflora, *Arbutus Menziesii*, *Pseudotsuga taxifolia*, *Castanopsis chrysophylla*, *Umbellularia californica*, *Acer macrophyllum*, *Quercus chrysolepis*, *Q. Kelloggii*, *Corylus californica*, *Cornus Nuttallii*, *Ceanothus Parryi*.

Along inner edge of the Redwood Forest and on higher hills within it, mostly in the North Coast Ranges, but as far south as the Santa Cruz Mountains and the north side of the Santa Lucia Mountains, at elevations of 200 to 2,500 feet.

Average rainfall 25 to 65 inches, with some fog; growing season 7 to 11 months, with 200 to 300 frost-free days; mean summer maximum temperatures 75°-90° F., mean winter minima 29°-39° F.

Trees to 100 feet or more tall, in rather close stands, often with brush beneath and with grassland islands referable to Coastal Prairie. Many members of this community, which fraternize with the Redwood, also enter the Yellow Pine Forest as important constituents, even accompanying it from the Coast Ranges to Mt. Shasta and well southward along the Sierra Nevada.

19. Northern Oak Woodland

Quercus Garryana, *Q. Kelloggii*, *Q. chrysolepis*, *Q. Wislizenii*, *Acer macrophyllum*, *Aesculus californica*, *Arctostaphylos Manzanita*.

North Coast Ranges from Humboldt and Trinity counties as far south as Napa County and inland from the Redwood Forest to the Yolla Bolly Mountains, ascending to 3,000 or even 5,000 feet.

Average rainfall 25 to 40 inches; growing season 6 to 9 months, with 180 to 265 frost-free days; mean summer maximum temperatures 80°-94° F., and mean winter minima 31°-38° F.

Trees 25 to 75 feet tall, in rather open woodland with little undergrowth.

23. Coastal Prairie

Festuca idahoensis, *Danthonia californica*, *Calamagrostis nutkaensis*, *Deschampsia caespitosa* subsp. *holciformis*, *Holcus lanatus*, *Pteridium aquilinum* var. *pubescens*, *Carex tumulicola*, *Brodiaea pulchella*, *Iris Douglasiana*, *Sisyrinchium bellum*, *Calochortus luteus*, *Ranunculus californicus*, *Lupinus formosus*, *L. variicolor*, *Sanicula arctopoides*, *Chrysopsis Bolanderi*, *Grindelia hirsutula*.

Open temperate hill-grasslands or glades or bald hills; west slopes of outer and middle Coast Ranges from Mendocino and Trinity counties north-

ward and as scattered patches south to San Francisco Bay. Occurring mostly below 4,000 feet.

Climatic data much as for Northern Oak Woodland.

Originally bunch grasses with various flowering herbs; now partly superseded by annual introduced weedy grasses. Sometimes divided into a coastal strip, where there is intergradation with our Northern Coastal Scrub, and hill prairie or the open hill grasslands. Since both occur fairly near the coast and have largely the same species, we are keeping these "temperate grasslands" of northern affinities as one community and separate from the more interior Valley Grassland community of more southern relationships.