

**California Wildlife Habitat Relationships System**  
**California Department of Fish and Game**  
**California Interagency Wildlife Task Group**

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## Annual Grassland

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## Vegetation

**Structure.** Annual Grassland habitats are open grasslands composed primarily of annual plant species. Many of these species also occur as understory plants in Valley Oak Woodland (VOW) and other habitats. Structure in Annual Grassland depends largely on weather patterns and livestock grazing. Dramatic differences in physiognomy, both between seasons and between years, are characteristic of this habitat. Fall rains cause germination of annual plant seeds. Plants grow slowly during the cool winter months, remaining low in stature until spring, when temperatures increase and stimulate more rapid growth. Large amounts of standing dead plant material can be found during summer in years of abundant rainfall and light to moderate grazing pressure. Heavy spring grazing favors the growth of summer-annual forbs, such as tarweed and turkey mullein, and reduces the amount of standing dead material. On good sites, herbage yield may be as high as 4900 kg/ha (4400 lb/ac) (Garrison et al. 1977).

**Composition.** Introduced annual grasses are the dominant plant species in this habitat. These include wild oats, soft chess, ripgut brome, red brome, wild barley, and foxtail fescue. Common forbs include broadleaf filaree, redstem filaree, turkey mullein, true clovers, bur clover, popcorn flower, and many others. California poppy, the State flower, is found in this habitat. Perennial grasses, found in moist, lightly grazed, or relic prairie areas, include purple needlegrass and Idaho fescue. Vernal pools, found in small depressions with a hardpan soil layer, support downingia, meadowfoam, and other species (Parker and Matyas 1981). Species composition is also related to precipitation (Bartolome et al. 1980). Perennial grasses are more common on northern sites with mean annual rainfall greater than 150 cm (60 in). Soft chess and broadleaf filaree are common in areas with 65-100 cm (25-40 in) of rainfall, and red brome and redstem filaree are common on southern sites with less than 25 cm (10 in) of precipitation (Bartolome et al. 1980).

**Other Classifications.** Annual Grassland habitat has been described as Valley Grassland (Munz and Keck 1959, Heady 1977), Valley and Foothill Grassland (Cheatham and Haller 1975), California Prairie (Küchler 1977), Annual Grasslands Ecosystem (Garrison et al. 1977), Brome grass, Fescue, Needlegrass, and Wild Oats series (Paysen et al. 1980), and Annual Grass-Forb series (Parker and Matyas 1981).

## Habitat Stages

**Vegetation Changes 1-2:S-D.** Annual Grassland habitats occupy what was once a pristine native grassland. The native grassland likely consisted of climax stands of perennial bunchgrasses, such as purple needlegrass, on wetter sites (Bartolome 1981, Bartolome and Gemmill 1981), with annual species existing as climax communities on drier alluvial plains (Webster 1981). Today, plant succession in the classical sense does not occur in Annual Grassland habitats. However, species composition is greatly influenced by seasonal and annual fluctuations in weather patterns. Annual plants germinate with the first fall rains that exceed about 15 mm (0.6 in), growing slowly during winter and more rapidly in spring (Heady 1977). Botanical composition changes throughout the growing season because of differences in plant phenology (Heady 1958). Most annuals mature between April and June (Heady 1977), although some species, such as tarweed and turkey mullein, continue to grow into summer. Fall rains that encourage germination, followed by an extended dry period, favor the growth of deep-rooted forbs (Duncan and Woodmansee 1975), but continuing rainfall favors rapidly growing grasses (Pitt and Heady 1978). Livestock grazing favors the growth of low-stature, spring-maturing forbs, such as filaree (Freckman et al. 1979), and summer annuals, such as turkey mullein (Duncan 1976). Because these are important food plants for many wildlife species, proper levels of livestock grazing are generally beneficial in this habitat. In the absence of livestock, Annual Grassland habitats are often dominated by tall, dense stands of grasses such as ripgut brome (Freckman et al. 1979) and wild oats.

**Duration of Stages--** Although Annual Grassland habitats consist largely of non-native annuals, these effectively prevent the reestablishment of native perennials over large areas and now comprise climax communities (Heady 1977). Introduced annuals should be considered naturalized plant species and so managed, rather than as invading species characteristic of poor range sites.

## Biological Setting

**Habitat.** Annual Grassland habitat is found just above or surrounding Valley Foothill Riparian (VRI), Alkali Desert Scrub (ASC), Fresh Emergent Wetland (FEW), Pasture (PAS) and all agricultural habitat types, and below Valley Oak Woodland (VOW), Blue Oak Woodland (BOW), Blue Oak-Foothill Pine (BOP), Chamise-Redshank (CRC), and Mixed Chaparral (MCH) habitats. Annual Grassland habitat also borders Coast Oak Woodland (COW), Closed Cone-Pine-Cypress (CPC), Coastal Scrub (CSC), and Eucalyptus (EUC) habitats.

**Wildlife Considerations.** Many wildlife species use Annual Grasslands for foraging, but some require special habitat features such as cliffs, caves, ponds, or habitats with woody plants for breeding, resting, and escape cover. Characteristic reptiles that breed in Annual Grassland habitats include the western fence lizard, common garter snake, and western rattlesnake (Basey and Sinclear 1980). Mammals typically found in this habitat

include the black-tailed jackrabbit, California ground squirrel, Botta's pocket gopher, western harvest mouse, California vole, badger, and coyote (White et al.1980). The endangered San Joaquin kit fox is also found in and adjacent to this habitat (U.S. Fish and Wildlife Service 1983). Common birds known to breed in Annual Grasslands include the burrowing owl, short-eared owl, horned lark, and western meadowlark (Verner et al. 1980). This habitat also provides important foraging habitat for the turkey vulture, northern harrier, American kestrel, black-shouldered kite, and prairie falcon.

## Physical Setting

Annual Grassland habitat occurs mostly on flat plains to gently rolling foothills. Common soil orders include Entisols and Alfisols (Garrison et al.1977). Entisols are often found at lower elevations on flood plains and swales that receive periodic deposits of alluvium (U.S. Soil Conservation Service1975), and are characterized by little or no pedogenic horizon development. Alfisols occur at higher elevations above the valley floor (Garrison et al.1977). Some Annual Grassland habitats can be found in the drier portion of the southern San Joaquin Valley on Aridisols (Garrison et al. 1977). Climatic conditions are typically Mediterranean, with cool, wet winters and dry, hot summers. The length of the frost free season averages 250 to 300 days (18 to 21 fortnights) (Garrison et al. 1977). Annual precipitation is highest in the north (Redding, 960 mm (38 in) ) and north coast (Ukiah, 909 mm (36 in)), decreasing to the south (Sacramento, 430 mm (17 in); Stockton, 339 mm (13 in); Fresno, 259 mm (10 in)), and reaching a minimum in the southern San Joaquin Valley (Bakersfield, 150 mm (6 in) ) (Major 1977).

## Distribution

Annual Grassland habitat occurs in patches of various sizes throughout the state

## Literature Cited

- Bartolome, J. W. 1981. *Stipa pulchra*, a survivor from the California prairie. *Fremontia* 9(1):3-6.
- Bartolome, J. W., M. C. Stroud, and H. F. Heady. 1980. Influence of natural mulch on forage production on differing California annual range sites. *J. Range Manage.* 33:4-8.
- Bartolome, J. W., and B. Gemmill. 1981. The ecological status of *Stipa pulchra* (Poaceae) in California. *Madroño* 28:172- 184.
- Basey, H. E., and D. A. Sinclear. 1980. Amphibians and reptiles. Pages 13-74 In J. Verner and A. S. Boss, tech. coords. *California wildlife and their habitats: western Sierra Nevada*. U.S. Dep. Agric., For. Serv. (Berkeley, Calif.), Gen. Tech. Rep. PSW-37.

- Cheatham, N. H., and J. R. Haller. 1975. An annotated list of California habitat types. Univ. of California Natural Land and Water Reserve System, unpubl. manuscript
- Duncan, D. A. 1976. Frequent mowing increases turkey mullein on California foothill rangeland. *Calif. Fish and Game* 62:82-84.
- Duncan, D. A., and R. G. Woodmansee. 1975. Forecasting forage yield from precipitation in California's annual rangeland. *J. Range Manage.* 28:327-329.
- Freckman, D. W., D. A. Duncan, and J. R. Larson. 1979. Nematode density and biomass in an annual grassland ecosystem. *J. Range Manage.* 32:418-422.
- Garrison, G. A., A. J. Bjugstad, D. A. Duncan, M. E. Lewis and D. R. Smith. 1977. Vegetation and environmental features of forest and range ecosystems. U.S. Dep. Agric., For. Serv., Handbook No. 475.
- Heady, H. F. 1958. Vegetation changes in the California annual type. *Ecology* 39:402-416.
- Heady, H. F. 1977. Valley grassland. Pages 491-514 In M. G. Barbour and J. Major, eds. *Terrestrial vegetation of California*. John Wiley and Sons, New York.
- Kuchler, A. W. 1977. Appendix: the map of the natural vegetation of California. Pages 909-938 In M. G. Barbour and J. Major, eds, *Terrestrial vegetation of California*. John Wiley and Sons, New York.
- Major, J. 1977. California climate in relation to vegetation. Pages 11 -74 In M. G. Barbour and J. Major, eds., *Terrestrial vegetation of California*. John Wiley and Sons New York.
- Munz, P. A., and D. D. Keck. 1959. *A California flora*. Univ of California Press, Berkeley.
- Parker, I., and W. J. Matyas. 1981. CALVEG: a classification of Californian vegetation. U.S. Dep. Agric., For. Serv., Reg. Ecol. Group, San Francisco.
- Pitt, M. D., and H. F. Heady. 1978. Responses of annual vegetation to temperature and rainfall patterns in northern California. *Ecology* 59:336-350.
- Paysen, T. E., J. A. Derby, H. Black, Jr., V. C. Bleich, and J. W. Mincks. 1980. A vegetation classification system applied to southern California. U.S. Dep. Agric., For. Serv., (Berkeley, Calif.) Gen. Tech. Rep. PSW-45.
- U.S. Fish and Wildlife Service 1983b. San Joaquin kit fox recovery program. U.S. Dep. Interior, Fish and Wildl. Serv. Portland, Ore.
- U.S. Soil Conservation Service. 1975. Soil taxonomy a basic system of soil classification for making and interpreting soil surveys. U.S. Dep. Agric., Agric. Handbook.
- Verner, J., E. C. Beedy, S. L. Granholm, L. V. Ritter, and E. F. Toth. 1980. Birds. Pages 75-319 In J. Verner and A. S. Boss, tech. coords. *California wildlife and their habitats: western Sierra Nevada*. U.S. Dep. Agric., For. Serv. (Berkeley, Calif.) Gen. Tech. Rep. PSW-37.
- Webster, L. 1981. Composition of native grasslands in the San Joaquin Valley, California. *Madroño* 28:231-241.
- White, M., R. H. Barrett, A. S. Boss, T. F. Newman, T. J. Rahn, and D. F. Williams. 1980. Mammals. Pages 321-424 In J. Verner and A. S. Boss, tech. coords. *California wildlife and their habitats: western Sierra Nevada*. U.S. Dep. Agric. For. Serv., (Berkeley, Calif.), Gen. Tech. Rep. PSW-37.