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

Urban

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Vegetation

Structure-- The structure of urban vegetation varies, with five types of vegetative structure defined: tree grove, street strip, shade tree/lawn, lawn, and shrub cover. Tree groves, common in city parks, green belts, and cemeteries, vary in height, tree spacing, crown shape, and understory conditions, depending upon the species planted and the planting design. However, they have a continuous canopy. Mature tree groves in San Francisco vary in height from 19.3 m (64 ft) (eucalyptus) to 14.5 m (48 ft) (Monterey cypress). Ground cover in these groves ranges from 0 to 90 percent (McBride and Froehlich 1 984). Street tree strips show variation in spacing of trees, depending upon species and design considerations. Both continuous and discontinuous canopies are observed. Most street tree strips are planted in grass, but other ground covers are not uncommon. Shade trees and lawns are typical of residential areas and reminiscent of natural savannas. Structural variation in the shade tree/lawn type is typical when a large number of species are incorporated in the landscape. Lawns are structurally the most uniform vegetative units of the California urban habitat. A variety of grass species are employed, which are maintained at a uniform height and continuous ground cover. Biomass productivity is greater than natural grasslands because of irrigation and fertilization (Falk 1977). Shrub cover is more limited in distribution than the other structural types. Hedges represent a variation of the urban shrub cover type. Species, planting design, and maintenance control the structural characteristics of this types. Height ranges from 10 cm (4 in) tall to tree height.

The juxtaposition of urban vegetation types within cities produces a rich mosaic with considerable edge areas. The overall mosaic may be more valuable as wildlife habitat than the individual units in that mosaic.

Composition-- Species composition in urban habitats varies with planting design and climate. Monoculture is commonly observed in tree groves and street tree strips. A survey of tree groves in San Francisco parks showed that three species (eucalyptus, Monterey cypress, and Monterey pine) composed 75 percent of total tree cover (McBride and Froehlich 1984), and these species were almost exclusively planted in pure stands. Climatic variation associated with elevation in California also influences the mix of tree species. For example, in urban areas a comparison of urban forests found a species richness of 7 tree species per hectare (=3/acre) in South Lake Tahoe and 30 tree species/ hectare (=12/acre) in Menlo Park. The difference in species richness is due largely to the low winter temperatures in South Lake Tahoe (McBride and Jacobs 1979).

A distinguishing feature of the urban wildlife habitat is the mixture of native and exotic species. Both native and exotic species are valuable, with exotic species providing a good source of additional food in the form of fruits and berries.

Other Classifications-- Detwyler (1972) has classified urban vegetation into four major types: the interstitial forest, consisting of trees growing between man's constructions (buildings, streets, etc.); parks and green zones, existing in blocks or sizable patches that are relatively unbroken by human construction; gardens, in which are green ornamental plants as well as food plants; and lawns, or interstitial grasslands. Clemens et al. (1984) suggest an additional classification unit, demolition sites those urban lands cleared of structures and supporting spontaneous vegetative cover. Many recent demolition sites in California cities are dominated by annual grasses and pioneer shrub species. The demolition site category also comprises vacant urban lands not supporting native vegetation types. Some commercial and industrial portions of urban areas are without any vegetative cover. These areas do, however, serve as habitat for a limited number of wildlife species.

Habitat Stages

Vegetation Changes-- Most units of urban vegetation are relatively static in species composition because of maintenance. Unmaintained units often are invaded by exotic and native species. Unmaintained forest groves at the Presidio, San Francisco, have developed locally dense understories of poison-oak or Algerian ivy. Lawns are commonly invaded by Bermuda grass and crab grass as well as broad leaved weeds (i.e., dandelion, English daisy, etc.).

Viewed from early urbanization to the present, urban vegetation appears less static. McBride and Jacobs (1976) describe changes in the preference of Menlo Park homeowners for different tree species over the last 100 years. The California pepper tree and London plane have been supplanted by camphor, Modesto ash, purple plum, and sweetgum. Vegetation structure also changes through time as a result of maturation. Tree and shrub height, and crown closure, increase during this maturation process.

Duration of Stages-- Urban vegetation, especially urban tree cover, is relatively recent only about 100 years. Many trees remain from presettlement forest or savanna and can be expected to survive for centuries. In contrast, most species in urban tree groves are not long-lived. For example, Monterey pine and Monterey cypress are relatively short-lived species, only 100 to 150 years. Windthrow and wind breakage are common to stands where these species exceed 90 years old (McBride and Froehlich 1984). In older stands in Golden Gate Park, San Francisco, tree defects were observed in 91 percent of Monterey pine and 56 percent of Monterey cypress trees (Smith et al. 1980).

Biological Setting

Habitat-- Urban development has occurred within or adjacent to most other habitats in California, with the highest density at lower elevations. The majority of urban developments exceeding 10,000 in population were developed in grassland or scrub (coastal sagebrush or chaparral) vegetation. Very probably the original vegetation at such locations was modified by agriculture and today most of our cities are surrounded by agricultural and grazing lands rather than natural vegetation.

Wildlife Considerations-- Three urban categories relevant to wildlife are distinguished: downtown, urban residential, and suburbia. The heavily-developed downtown is usually at the center, followed by concentric zones of urban residential and suburbs. There is a progression outward of decreasing development and increasing vegetative cover. Species richness and diversity is extremely low in the inner cover. Rock dove, house sparrow, and starling comprise over 90 percent of all avian density and biomass (Emlen 1974).

The urban residential zone is characterized by a denser and more varied mosaic of vegetation shade trees, lawns, hedges and planted gardens; approximately 40 percent of the land's surface is covered by impervious material. This region is characterized by a variety of bird species including scrub jay, mockingbird, house finch, (Jaeger and Smith 1966, Smith 1968, Guthrie 1974, Sproul 1975, Williams and Monroe 1976). Associates in the urban residential areas include the raccoon, opossum, striped skunk, (Berry and Berry 1959) and California slender salamander (Stebbins 1972).

Suburban areas with mature vegetation closely approximate the natural environment. In addition to landscaped gardens and lawns, relatively large tracts of adjacent natural vegetation such as chaparral, grasslands, and oak woodland abound. Wildlife diversity increases while species density decreases (Thomas and DeGraaf 1975) and proportionately greater numbers of native species occur. Bird species include wrentits, bushtits, plain titmouse, chestnut-backed chickadee, California quail, (Jaeger and Smith 1966, Smith 1968, Guthrie 1974, Sproul 1975, Williams and Monroe 1976). Common mammals are black-tailed deer, ringtail, black-tailed jackrabbit, (Berry and Berry 1959, Jaeger and Smith 1966, Williams and Monroe 1976). Gopher snake and western fence lizard also occur in this zone.

Physical Setting

Urban habitats are not limited to any particular physical setting. The first California cities were situated along coastline or major rivers providing marine or riparian habitats which continue to influence wildlife diversity in these cities.

Urban climate varies in temperature and wind velocity from the surrounding countryside (Lowry 1967). Heat islands, warmer zones in the most densely developed portions or cities, often show temperatures that are 3 to 5 C warmer than the undeveloped landscape. Wind velocities are reduced in urban areas except where highrise construction has occurred. Tall structures can funnel wind through man-made canyon to

velocities well above those found over undeveloped landscape.

Distribution

The urban habitat occurs throughout California. From the smallest villages to the highest metropolitan areas, the urban habitat is the result of modifying presettlement vegetation and introducing new species.

Literature Cited

Berry, W. D., and E. B. Berry. 1959. Mammals of the San Francisco Bay Region. California Natural History Guide No. 2, Univ. of California Press, Berkeley.

Clemens, J., C. Bradley, and O. L. Gilbert. 1984. Early development of vegetation on urban demolition sites in Sheffield, England. Urban Ecology 8:139-148.

Detwyler, T. R. 1972. Urbanization and environment. Duxbury Press, Belmont, Calif.

Emlen, J. T. 1974. An urban bird community in Tucson, Arizona: derivation, structure, regulation. Condor 76:1 84-1 97.

Falk, J. H. 1977. The frenetic life forms that flourish in suburban lawns. Smithsonian 8(1):90-96.

Guthrie, D. A. 1974. Suburban bird population in Southern California. Amer. Midl. Nat. 92:461-466.

aeger, E. C., and A. C. Smith. 1966. Introduction to the natural history of southern California. California Natural History Guide No. 13, Univ. of California Press, Berkeley.

Lowry, W. P. 1967. The climate of cities. Sci. Amer. Aug:87-93.

McBride, J. R., and D. Froehlich. 1984. Structure and condition of older stands in parks and open space areas of San Francisco, California. Urban Ecology 8:165-178.

McBride, J. R., and D. Jacobs. 1976. Urban forest development: a case study, Menlo Park, California. Urban Ecology 2:1-14.

McBride, J. R., and D. Jacobs. 1979. Urban forest structure: a key to urban forest planning. Calif. Agric. 33(5): 24.

Smith, A. C. 1968. Introduction to the natural history of the San Francisco Bay Region. California Natural History Guide No. 1, Univ. of California Press, Berkeley.

Smith, S., D. Froehlich, and D. R. Miller.1980. Golden Gate Park forest management plan. State of California Resources Agency, Sacramento, Calif.

Sproul, M. 1975. The effect of surburbanization on bird populations in the Moraga area of California. M. S. thesis, Univ. of California, Berkeley.

Stebbins, R. C.1972. Amphibians and reptiles of California. California Natural History Guide. No. 31, Univ. of California Press, Berkeley.

Thomas, J. W., and R. M. DeGraaf. 1975. Wildlife habitats in the city. Pages 48-68 In Proceedings, Wildlife in Urban Canada, Univ. of Guelph, Ontario.

Williams, J. C., and H. C. Monroe. 1976. Natural history of northern California. Kendall/Hunt Publ. Co., Dubuque, lowa.