

# Introduction and Scope

Jared Verner and Allan S. Boss

The Forest Service, U.S. Department of Agriculture, is mandated by law to manage its lands in a manner that assures the conservation of all animal species. The Multiple Use-Sustained Yield Act of 1960, the Endangered Species Act of 1973, the Forest and Rangeland Renewable Resources Planning Act of 1974, and the National Forest Management Act of 1976 all explicitly recognize animals as among our important, renewable natural resources. This statutory requirement poses a formidable assignment, as thousands of species of animals are found in National Forests throughout the United States. Even within a single National Forest the number is likely to run into the hundreds, just considering vertebrate species alone.

Adequate assessment of the potential responses of all these species to alternative land and resource management programs requires an up-to-date data base on the habitat requirements and basic life history of each species. The biological literature on animal life histories and habitat requirements is voluminous, but it falls short of being adequate for the assessment needs. It nonetheless provides a substantial foundation for arranging information in a form useful as a tool in considering the consequences of alternative management options.

This publication has assembled in such a form biological information about the amphibians, reptiles, birds, and mammals regularly found on forest and range lands of the western Sierra Nevada of California.

## Species Included

Notes on life history and habitat requirements of 355 species, grouped by taxonomic class, are included in this publication. The species within each group are arranged in phylogenetic order, and each has been assigned an alphanumeric code for purposes of cross referencing and for obtaining access to computer-stored data on each species. Reference codes for the groups of species are:

Group	Species	Reference Codes
Amphibians	26	A001 through A026
Reptiles	27	8001 through 8027
Birds	208	B001 through B208
Mammals	94	M001 through M094

An additional 57 bird species that show only "accidental" occurrence in the zone are not treated in detail here, but are listed in the section on Rare Species in the *Bird* chapter.

## Species/Habitat Matrices

Species/habitat matrices display information in a simple, straightforward, tabular format that can be learned in a matter of minutes (fig. 2). Some time should be spent on becoming familiar with the elements of the matrices, because they form the single most important part of the publication.

### Species

The species are arranged in the same phylogenetic sequence as the text notes and are identified by the same alphanumeric codes. The page number of the notes and distribution map for each species is shown in a separate "Page" column of the matrix.

The Pacific Southwest Region of the Forest Service has established the following *Emphasis Species* priority for management:

1. *Recovery Species*: species in these categories are identified in the name block of the matrix.
  - a. *Endangered Species*: any species threatened with extinction.
  - b. *Threatened Species*: any species likely to become endangered within the foreseeable future, throughout all or a significant part of its range.
  - c. *Rare Species*: same as a Threatened Species (this is a State of California classification).
  - d. *Sensitive Species*: any species, as designated by the Regional Forester, Pacific Southwest Region, that is under study for classification as Threatened, Endangered, or Rare, or that has a low population density or highly restricted range for which National Forests make up a significant portion of the available habitat.
2. *Harvest Species*: species subject to sport or commercial harvest under regulations of the California Fish and Game Commission.
3. *Special Interest Species*: nonharvest species of special public interest that were formerly referred to as "unique."

All other species are recognized as *Maintenance Species*.

### Special Habitat Requirements

These requirements are entered in the next block. *Items included here are deemed to be essential for a given species to occur regularly or to reproduce.* Many of these items, such as trees, shrubs, stumps, old buildings, and willow thickets, require no definition or explanation. Others, however, need further clarification. These are listed and defined below under substrate, aquatic, vegetation, and miscellaneous elements.

### Substrate Elements

- *Ground burrows*: Burrows excavated by species other than those for which they are special requirements.
- *Friable soil*: Relatively soft, crumbly soil suitable for burrowing; this will also generally be a well-aerated soil.
- *Sand*: Substrate of nearly pure sand, or sandy banks along streams.
- *Moist soil*: Surface area damp to wet but not saturated, occurring near springs, seeps, streams, ponds, or other aquatic sites.
- *Earthen banks*: Road cuts, stream banks, and other areas of nearly vertical, exposed soil suitable for burrowing.
- *Rock outcrops*: Fairly substantial outcrops with large boulders and plenty of hiding places.
- *Caves*: Areas suitable for roosting or hibernation or both, including mines and other human excavations resembling caves.
- *Limestone outcrops*: Moist outcrops of limestone essential to certain species of amphibians.
- *Talus*: Sloping mass of rock fragments commonly found at the base of a cliff.
- *Cliffs*: Steep rock faces of varying size, which are required by many species for nest placement--mostly on ledges or in recesses.
- *Crevices*: Larger cracks in cliffs and smaller rock faces.

### Aquatic Elements

- *Water*: Any unspecified water source, even stock watering tanks, typically required for drinking or bathing.
- *Seeps*: Areas of underground water seepage that saturate the soil, generally over a fairly large area.
- *Springs*: Point sources of water flow from underground; they may or may not occur together with seeps.
- *Streams or rivers*: Moving water courses of any width. Streams are smaller than rivers although no precise separation between these categories is intended here.
- *Permanent streams (or rivers)*: Those that maintain water flow year round.
- *Pools in permanent streams (or rivers)*: Those having reduced rates of water flow and at least 3 ft (1 m) deep.
- *Ponds*: Standing bodies of water with less than 1 acre (0.4 ha) of surface area.
- *Lakes*: Standing bodies of water with 1 acre (0.4 ha) of surface area or more.
- *Marshes*: Substantial patches (at least 1 acre [0.4 ha]) of emergent vegetation, usually cattails (*Typha*) or

bulrush (*Scirpus*), along the margins of ponds, lakes, streams, rivers, or in wet meadows.

### Vegetation Elements

- *Forest openings*: Areas in otherwise fairly dense stands where most or all of the tree canopy is missing for any reason; may be covered with grasses and forbs only, or may have some shrub cover, not exceeding 50 percent.
  - *Small openings*--Less than 1 acre (0.4 ha) in extent.
  - *Medium openings*--From 1 to 5 acres (0.4 to 2 ha) in extent.
  - *Large openings*--Larger than 5 acres (2 ha) in extent.
- *Trees/shrubs*: Interspersed patches of shrubs and trees.
- *Trees/grass forbs*: Interspersed patches of trees and grass and/or forbs.
- *Shrubs/grass-forbs*: Interspersed patches of shrubs and grass and/or forbs, as often develop in early succession or in ecotones.
- *Snags*: Standing, dead or partially dead trees at least 11 inches (28 cm) dbh and 12 ft (3.7 m) high.
- *Elevated perches*: Places in trees, shrubs, or snags, or on fence posts, power poles, buildings, or any other spot affording a view of the surrounding terrain.
- *Nest cavities*: Natural or excavated cavities in living or dead trees, suitable for shelter or nesting by birds or small mammals.
- *Hollows*: Provided by hollow logs, hollow bases of trees, openings created at the bases of upturned roots of fallen trees, or any other such openings large, enough to shelter larger animals.
- *Logs*: Downed boles at least 10 inches (25 cm) in diameter at the large end, recently fallen to meet the cover needs of some species, or in advanced stages of decomposition and moist near the ground, to meet needs of other species.
- *Litter*: Downed and decaying bark, foliage, twigs, branches, and smaller stems providing substantial cover of the ground, at least in patches.

### Miscellaneous Elements

- *Open Terrain*: Extensive open areas, not necessarily surrounded by forest, although forests may form an ecotone along one or more sides of such terrain, including extensive alpine meadows above treeline and expansive annual grasslands at low elevations.
- *Low human disturbance*: Any sort of human intrusion into a habitat. (It is not possible here to set quantitative limits on human disturbance; each case must be considered individually and evaluated in the context of what is known of the species.)

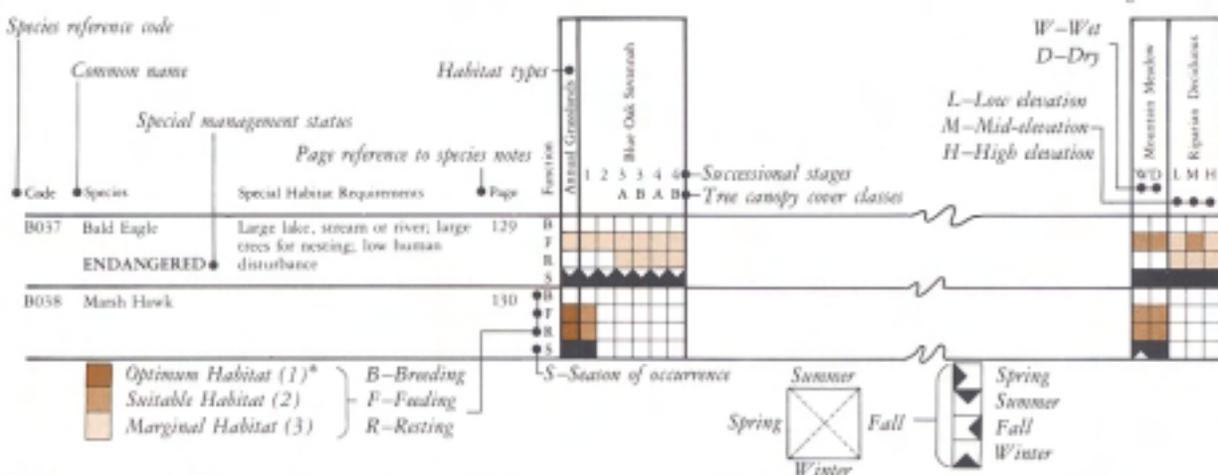
## Habitat Stages

A *habitat stage* is identified by its particular combination of habitat type, successional stage, and percentage canopy closure. Seventy different habitat stages are recognized here.

**Habitat Types**—The habitat types are based largely on those found in *Forest Cover Types of North America* (Society of American Foresters 1954) with some modifications adopted to reflect what is known of animal species distribution and habitat selection. These types are translatable into all other vegetation classification systems commonly used today on National Forests of California. The habitat types listed here generally tend to occur at lower elevations in the northern than in the southern Sierra Nevada.

- **Annual grasslands:** Dominated by wild oats (*Avena* spp), rip gut (*Bromus rigidus*), soft chess (*Bromus mollis*), bur clover (*Medicago hispida*), and filaree (*Erodium* spp), with less than 5 percent shrub and/or tree canopy.
- **Blue oak savannah:** Characterized by annual grassland understory with scattered blue oak (*Quercus douglasii*).
- **Digger pine-oak:** Dominated by digger pine (*Pinus sabiniana*) and blue oak, with lesser amounts of interior live oak (*Quercus wislizenii*). Understory vegetation consists of mixtures of mariposa manzanita (*Arctostaphylos mariposa*), buckbrush (*Ceanothus cuneatus*), redberry (*Rhamnus crocea*), California coffeeberry (*Rhamnus californica*), western mountain mahogany (*Cercocarpus betuloides*), other shrub species and annual grasses and forbs. This type ranges generally from about 300 to 2000 ft (91

- **Chaparral:** Characterized by mixtures of mariposa manzanita, western mountain mahogany, buckbrush, dwarf interior live oak (*Quercus wislizenii*, var. *frutescens*), California scrub oak (*Quercus dumosa*), chamise (*Adenostoma fasciculatum*), and poison oak (*Rhus diversiloba*). The shrubs occur in dense to highly dense stands with little herbaceous understory. Elevation ranges from 1000 to 5000 ft (305 to 1520 m). Higher altitude brush fields are not included here in the chaparral type, but are treated as early successional stages of forest types.
- **Ponderosa pine:** Ponderosa pine (*Pinus ponderosa*) contributes over 80 percent of the stand, with white fir (*Abies concolor*) and black oak (*Quercus kelloggii*) present in amounts up to 20 percent. Sugar pine (*Pinus lambertiana*) mixes with ponderosa pine on better sites, while incense-cedar (*Calocedrus decurrens*), Douglas-fir (*Pseudotsuga menziesii*), and small amounts of white fir also may be present in the higher parts of the type. Elevation ranges from 2000 to 5000 ft (610 to 1520 m).
- **Black oak woodland:** Characterized by dense to rather open stands of black oak and associated hardwoods, with minor amounts of ponderosa pine or Douglas-fir, or both, and sometimes incense-cedar and white fir. The shrub understory is usually sparse, but may be quite dense in openings. Frequency and proportion of associated hardwoods increase as site quality declines, as on southern slopes or areas with less precipitation. They include canyon live oak (*Quercus chrysolepis*), bigleaf maple (*Acer macrophyllum*) (on wetter sites), and Pacific madrone (*Arbutus menziesii*). Characteristic understory species include poison oak and deer brush (*Ceanothus intergerrimus*).



\*Numbers to be used for computer coding of habitat quality designations.

Figure 2—The key to elements in the species/habitat matrix is found in the sample. For an explanation of the codes used, and definitions of the elements, see the subchapter on Species/Habitat Matrices.

Although black oak occurs throughout the western Sierra Nevada, typical black oak woodlands, as characterized here, are primarily restricted to the northern portion of the mountain range.

- *Mountain meadow*: Occurs in openings interspersed among the various timber types. Generally there is less than 20 percent shrub canopy, and trees may occur widely scattered, especially around the perimeters. Two meadow types—wet and dry—are recognized in this classification, although commonly both types may occur in the same opening. Wet meadows typically occur above 3900 ft (1200 m) in the north and 5900 ft (1800 m) in the south (Rundel *et al.* 1977). They support perennial sedges, rushes, and grasses (Cyperaceae, Juncaceae and Graminae). The soil is likely to remain wet late into the summer and in some places permanently. Willows (*Salix spp*) and alders (*Alnus spp*) may form rather dense thickets about these wetter sites. Dry meadows are dominated by perennial grasses and forbs, and most will have some sedges.
- *Riparian deciduous*: Occurs at most elevations where stream or pond conditions provide sufficient moisture for a narrow band of deciduous trees and shrubs along the margins. Three elevational categories are distinguished here: (1) Low elevation riparian deciduous (L) occurs generally downslope from the ponderosa pine forests; characteristic tree species are cottonwoods (*Populus*), California sycamore (*Platanus racemosa*), and willows. (2) Mid-elevation riparian deciduous (M) is approximately coincident with the mixed-conifer forest zone; characteristic species are white alder (*Alnus rhombifolia*), bigleaf maple, willows, California hazelnut (*Corylus rostrata*), western azalea (*Rhododendron occidentale*), and creek dogwood (*Cornus stolonifera*, *vas. Californica*). (3) High elevation riparian deciduous (H) is found generally above mixed-conifer forests; willow is the typical woody form in this type.
- *Mixed conifer*: Predominantly a five-species mixture of white fir, incense-cedar, sugar pine, ponderosa pine, and Douglas-fir, typically found from about 3000 to 6000 ft (915 to 1830 m) elevation. Other conifer species occur more sparingly, including lodgepole pine (*Pinus contorta*), Jeffrey pine (*Pinus jeffreyi*), red fir (*Abies magnifica*), and in a few restricted localities even giant sequoia (*Sequoiadendron giganteum*). The mixtures are exceedingly variable, with white fir dominating on north exposures and at higher elevations, and ponderosa pine tending to dominate at lower elevations and on drier sites. Sugar pine and incense-cedar are widely distributed

but rarely dominate. This type includes what some authorities refer to as the "white fir" type.

- *Jeffrey pine*: Jeffrey pine is the dominant species, with limited numbers of white fir. Ponderosa pine is often present in substantial numbers and many species, such as red fir, sugar pine, lodgepole pine, and black oak may be present in small numbers. Elevation ranges from about 3500 to 9000 ft (1070 to 2740 m).
- *Red fir*: Red fir occurs in pure stands or predominates in mixed stands with white fir. Jeffrey pine occurs on the more arid slopes, while western white pine (*Pinus monticola*) and lodgepole pine are included at higher elevations. At lower elevations, sugar pine is rather characteristically intermingled. This type occurs from 6000 to 9000 ft (1830 to 2740 m) elevation.
- *Lodgepole pine/mountain hemlock/whitebark pine* (shown on matrix heading as "lodgepole pine"): This conglomerate makes up the highest elevation forests, extending from the upper margins of the red fir zone up to timberline. Lodgepole pine is most often the dominant species, but western white pine, Jeffrey pine, and red fir may intermingle in varying amounts. Pure to nearly pure stands of mountain hemlock (*Tsuga mertensiana*) may occur on north-facing slopes, and at higher elevations whitebark pine (*Pinus albicaulis*) may occur in relatively pure stands. Lodgepole forests also occur in places at lower elevations, as in the red fir zone, where soil and moisture conditions are suitable. Here they may have a distinct fauna.
- *Alpine meadow*: Occurs above treeline. Sedges and other grasslikes (for example *Heleocharis* and *Scirpus*) comprise the chief dominants, with perennial grasses (especially *Calamagrostis breweri*) and forbs in varying mixtures comprising the remainder.

**Successional Stages**—Time, nature, and human activities bring changes in the structure and composition of a plant community that are reflected by changes in associated animal communities. To an extent these changes may be handled by recognizing successional stages of the various habitat types. The classification of successional stages usually implies a natural progression toward more mature stages, such as large trees or dense shrubs. Sometimes, however, ecological factors such as soil type or exposure may function to keep a stand of vegetation at a "lower" stage. In our classification, one would treat such a stand as a successional stage for determining wildlife associations. Mountain chaparral, for example, may be treated as a shrub stage of the predominating surrounding forest type. In projecting future for-

est habitats, it must not be assumed that such stands will progress toward big trees or dense shrubs.

Successional stages of tree and chaparral habitat types are identified numerically in the matrices; these are defined below. We have not differentiated successional stages for annual grassland, riparian deciduous, mountain meadow, or alpine meadow types.

- Successional stages of tree habitat types (*fig. 3*):
  - 1 (*Grass/forb stage*): Consists of annual and perennial grasses and forbs, with or without scattered shrubs and seedlings.
  - 2 (*Shrub/seedling/sapling stage*): Has mixed or pure stands of shrubs, tree seedlings, and tree saplings up to about 20 ft (6.1 m) in height.
  - 3 (*Pole/medium tree stage*): Includes larger trees, in the size range 20 to 50 ft (6.1 to 15 m) in height.
  - 4 (*Large tree stage*): Corresponds roughly to the mature and overmature classifications of foresters. Trees generally exceed 50 ft (15 m) in height, except perhaps with some of the oak types—especially at lower elevations.
- Successional stages of chaparral habitat:
  - 1 (*Grass/forb stage*): Essentially the same as the grass/forb stage of tree habitat types.
  - 2 (*Light shrub stage*): Has less than 50 percent canopy cover.
  - 3 (*Dense shrub stage*): Has 50 percent or greater canopy cover.

**Tree Canopy Closure Classes**—The extent of a shrub layer is paramount in the habitat selection of many animal species, particularly birds. The present classification omits direct reference to percent shrub cover, but the division of successional stages by percent canopy coverage deals indirectly with the question of shrub cover, because the growth of a shrub layer is related to the amount of sunlight able to pass through the canopy. Three canopy closure ratings are coded alphabetically for successional stages with trees in the species/habitat matrix (*fig. 4*).

- A: Total tree canopy cover from 0 to 39 percent; stands in this category commonly support a substantial shrub layer.
- B: Cover from 40 to 69 percent. The shrub layer is variable but usually present in the class B stands.
- C: Cover 70 percent or greater; typically little shrub layer is present under such a canopy. (Class C ratings are not included in the matrix for blue oak savannah or black oak woodland, because these stands rarely, if ever, achieve 70 percent or greater canopy cover.)

### *Species Activities*

Habitat utilization, by species, is rated separately for three major life history activities:

- B: Breeding (note that this term for mammals refers to the period when young are born and being nurtured).
- F: Feeding.

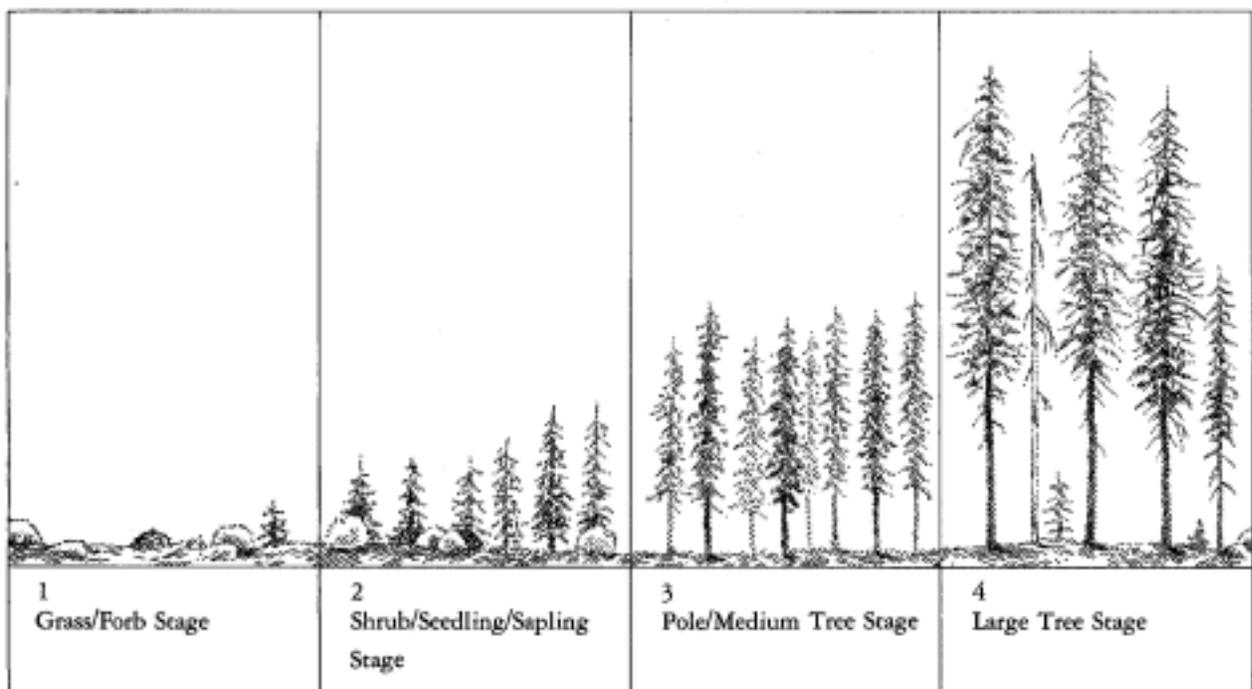


Figure 3—Successional stages for forest types in the Sierra Nevada of California.

### Season of Occurrence

All blocks in these rows showing season of species' occurrence are divided into four triangles, each one corresponding to a season. A shaded triangle indicates that the species predictably may be found in that habitat stage during the season indicated (see *fig. 2*).

- Left (spring): Approximately March through May.
- Top (summer): Approximately June through August.
- Right (fall): Approximately September through November.
- Bottom (winter): Approximately December through February.

### Habitat Suitability Rating

Suitability of each habitat stage for a given species was rated by the professional specialists, based on their review of the literature, their personal experience with the animals in the field, and opinions of others having field experience with the animals. Although these ratings are subjective, they nonetheless represent the best estimates currently available.

The habitat ratings are color-coded in the matrix. They also have been assigned ordinal number codes for ranking purposes associated with computer applications of the matrix information.

- Dark brown, computer code number 1 (*Optimum habitat*): Best quality habitat for a species, as judged by high breeding density or fre-

quency of use for feeding or resting cover.

Medium brown, computer code number 2 (*Suitable habitat*): Good habitat for the species, but not among the best, as judged by an intermediate breeding density or frequency of use for feeding or resting.

Light brown, computer code number 3 (*Marginal habitat*): As judged by observed animal density and/or frequency of use, habitat of this quality is used by the species, perhaps on a regular basis, but it does not contribute significantly over time to the maintenance of any population.

### Species Notes

Pertinent details not included in the species/habitat matrices are summarized in notes covering each species. Information is arranged in these categories: status, distribution/habitat, special habitat requirements, breeding, territory/home range, other, and references. Information from studies in the Sierra Nevada, or at least in California, was used whenever possible. When such studies were unavailable, data from studies elsewhere have been included and the study localities identified. California localities are designated by county only in the Species Notes; the State is understood to be California. Otherwise, locality information identifies the State where a study was done. The literature search was extensive, but not exhaustive.

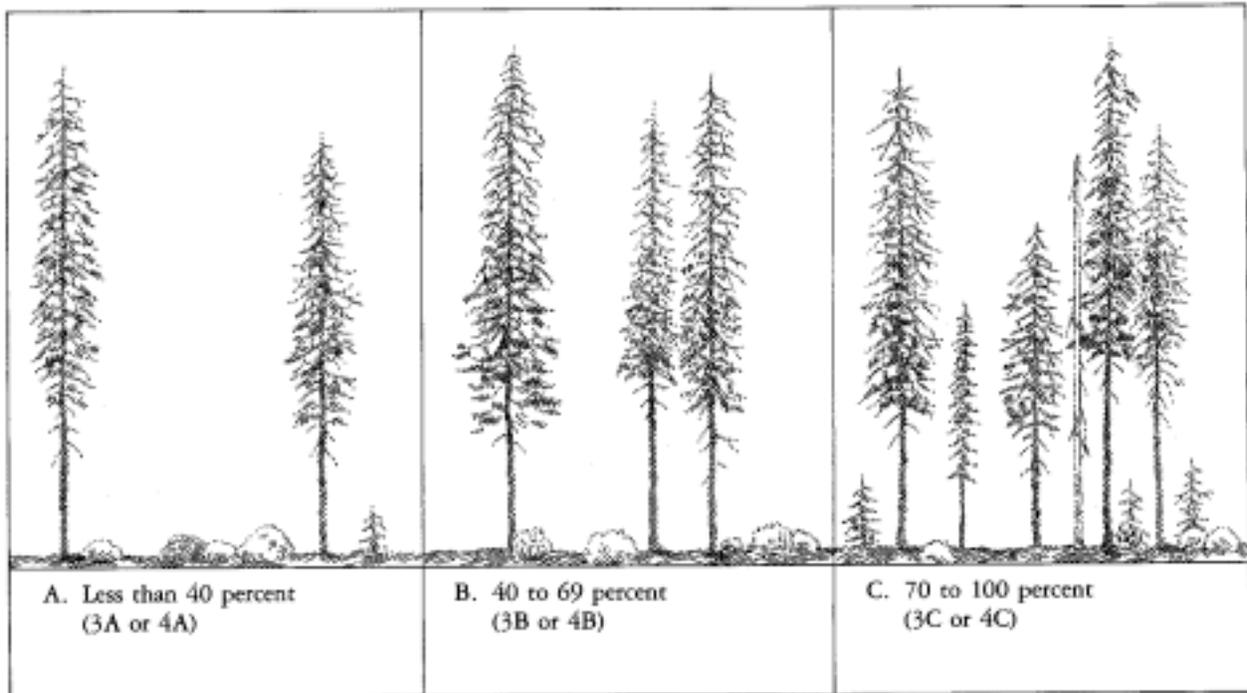


Figure 4-Canopy closure classes for successional stages 3 and 4 in the Sierra Nevada of California.

The Status of a species indicates whether or not it has been classified as to management significance and may include reference to any one of several possible classifications. The phrase "No official listed status" indicates that the species is not classified as Threatened, Endangered, or Rare by State or Federal agencies. The status of bird species is further qualified through reference to the National Audubon Society's "Blue List" for 1978 (Arbib 1977). This list is developed from information from regional authorities on birds throughout the United States. From observed trends in bird species numbers, they submit recommendations to the Society. Inclusion of a species on the blue list may be considered to identify species deserving special attention-species which may be candidates for future listing as Threatened or Endangered.

The **Distribution/Habitat** information summarizes data presented in the species/habitat matrix. All localities indicated in this section are understood to be in California. The **Special Habitat Requirements** information essentially duplicates that included in the species/habitat matrix, although some additional explanation may be added.

The section on **Breeding** gives information on breeding seasons (times of the year when young are produced and cared for); types of nesting, denning, or egg-laying sites; and numbers of eggs laid or offspring born. **Territory/Home Range** presents information on sizes of territories and home ranges, for both breeding and nonbreeding periods when available. **Other** is a miscellaneous category usually left blank, but sometimes providing specific management recommendations or other information of interest about the species.

The final category, References, cites literature on each species. The articles selected are among the most recent and contain references to the most useful articles on the species. They provide additional sources in the event further details about the species' life history are needed.

**Distribution Maps**

The approximate distribution of each species within the western Sierra Nevada is illustrated by a map. These maps show only the approximate boundaries of the zone covered by this report. Included counties are named.

Since amphibians, reptiles, and most mammals do not show any marked seasonal movements, their year-round distribution can be displayed by a single delineation. Distribution maps of the birds, however, are complicated by the altitudinal or latitudinal migration, or both, of most species. Therefore, maps for most bird species delineate separately their breeding distribution, their nonbreeding distribution, and their overlapping breeding and nonbreeding distribution (*fig. 5*).

These maps can be used to determine whether a species is likely to occur within a county or National Forest. However, they lack the fine detail needed to permit close determination of occurrence. Moreover, in many instances it was necessary to infer substantial portions of a species' distribution from information on habitat preferences, since the published literature does not always include specific references to each county or forest within which a species has been observed.

Maps for some species display a star to identify the locality of a restricted breeding distribution. In some instances, perhaps only a single breeding record is available for the species. In all such cases, the particular breeding status is discussed in the notes.

-  Area where species typically does not occur.
-  Nonbreeding distribution, nonpermanent resident. Occurrence is seasonal only, as for migration or wintering.
-  Breeding distribution. Species not typically found here except shortly before, during, and shortly after the breeding period.
-  Year-round distribution. Breeding may or may not occur here.
-  Localized breeding record.

Figure 5-Key to distribution codes for birds.

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